Solve The System Of Equations And Choose The Correct Ordered Pair. 5x+2y= 19 4x - 3y - 6 A (3,5) B. (5-3)

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Understanding how to solve systems of equations is a fundamental skill in algebra that allows students and learners to find the values of variables that satisfy multiple equations simultaneously. In this article, we will explore the step-by-step process of solving a specific system of equations, analyze the possible solutions, and determine which ordered pair correctly satisfies both equations.

Understanding Systems of Equations

A system of equations consists of two or more equations with the same set of variables. The goal is to find the values of these variables that make all the equations true at the same time. These solutions are known as the solutions to the system.

Types of solutions:

- Unique solution: The system has exactly one solution, which is an ordered pair (or set of ordered pairs).
- Infinite solutions: The equations represent the same line; every point on the line is a solution.
- No solution: The lines are parallel and do not intersect; the system has no solution.

Given System of Equations

Let's analyze the specific system presented:

1. $5x + 2y = 19$
2. $4x - 3y - 6 = 0$

Our task is to:

- Solve the system of equations.
- Determine which given ordered pair (A or B) satisfies both equations.

Rearranging Equations for Clarity

Before solving, it's often helpful to write each equation in a standard form:

- Equation 1: $5x + 2y = 19$
- Equation 2: $4x - 3y = 6$

The second equation has been rearranged by adding 6 to both sides.

Methods to Solve Systems of Equations

There are several methods to solve systems of equations:

- **Substitution Method:** Solving one equation for one variable and substituting into the other.
- **Elimination Method:** Adding or subtracting equations to eliminate a variable.
- **Graphical Method:** Plotting both equations to find the intersection point.

For this system, the elimination method is efficient because the coefficients are manageable, but substitution can also be used.

Step-by-Step Solution Using the Elimination Method

Let's proceed with the elimination method:

Step 1: Write the equations:

- $5x + 2y = 19$ ...(1)
- $4x - 3y = 6$ ...(2)

Step 2: Make the coefficients of one variable the same (or opposites).

To eliminate y, find a common coefficient for y:

- Multiply equation (1) by 3:

$3(5x + 2y) = 319$

15x + 6y = 57 ...(3)

- Multiply equation (2) by 2:

2(4x - 3y) = 26

8x - 6y = 12 ...(4)

Step 3: Add equations (3) and (4) to eliminate y:

(15x + 6y) + (8x - 6y) = 57 + 12

15x + 8x + 6y - 6y = 69

23x = 69

Step 4: Solve for x:

x = 69 / 23 = 3

Step 5: Substitute x = 3 into one of the original equations to find y.

Using equation (1):

5(3) + 2y = 19

15 + 2y = 19

2y = 19 - 15 = 4

y = 4 / 2 = 2

Solution to the System

The solution to the system is:

x = 3, y = 2

Expressed as an ordered pair: (3, 2)

Checking the Given Options

The options provided are:

- A: (3, 5)
- B: (5, -3)

Let's verify which of these satisfies both equations.

Verification of Option A: (3, 5)

- Substitute into equation 1:

$5(3) + 2(5) = 15 + 10 = 25 \neq 19$

- So, Option A does not satisfy the first equation; thus, it is not the correct solution.

Verification of Option B: (5, -3)

- Substitute into equation 1:

$5(5) + 2(-3) = 25 - 6 = 19$ ✓

- Substitute into equation 2:

$4(5) - 3(-3) = 20 + 9 = 29 \neq 6$

- Therefore, Option B does not satisfy the second equation.

Conclusion: Which Ordered Pair Is Correct?

Our calculated solution is (3, 2), which is not listed among the options. Neither Option A nor Option B fully satisfies both equations, indicating that the options may have a typo or are meant to test understanding.

However, since the options are limited, and Option A satisfies only the first equation, but not the second, and Option B satisfies only the first, but not the second, neither is the correct solution to the system.

Therefore, the correct approach is to recognize that the actual solution is (3, 2).

Additional Insights and Tips for Solving Systems of Equations

- Always verify your solutions by substituting the found values back into the original equations.
- Be cautious of negative signs and coefficients during calculations.
- Use substitution if one equation is easily solved for one variable.
- Use elimination when coefficients are compatible or can easily be manipulated to cancel out a variable.
- Graphical methods can provide a visual understanding but are less precise for exact solutions.

Summary

In solving the system:

- We used elimination to find the exact solution (3, 2).
- Neither of the provided options fully satisfies both equations.
- It is essential to verify solutions before finalizing.

Final Thoughts on Solving Systems of Equations

Mastering methods like substitution and elimination will enable you to handle various systems efficiently. Always remember to verify your solutions, and practice different problem types to strengthen your understanding.

Understanding how to solve systems of equations is crucial in algebra, engineering, economics, and many other fields. Whether dealing with linear equations or more complex systems, these skills form the foundation for problem-solving in quantitative disciplines.

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Frequently Asked Questions

What is the first step to solve the system of equations 5x + 2y = 19 and 4x - 3y = 6?

The first step is to decide whether to use substitution or elimination method; here, elimination is often easier by aligning coefficients.

How do you eliminate one variable in the system 5x + 2y = 19 and 4x - 3y = 6?

Multiply the equations to align coefficients of either x or y, then subtract or add to eliminate that variable. For example, multiply the first by 3 and the second by 2 to eliminate y.

What is the solution for x and y in the system 5x + 2y = 19 and 4x - 3y = 6?

Solving the system gives x = 3 and y = 5.

Which ordered pair correctly solves the system of equations 5x + 2y = 19 and 4x - 3y = 6?

The correct ordered pair is (3, 5).

How can you verify that (3, 5) is the correct solution to the system?

Substitute x=3 and y=5 into both equations; if both are true, then (3, 5) is the solution.

What is incorrect about choice B, (5, -3), as a solution to the system?

Substituting (5, -3) into the equations does not satisfy both, so it is not the correct solution.

Additional Resources

Solve The System Of Equations And Choose The Correct Ordered Pair is a fundamental skill in algebra that helps students and math enthusiasts understand how different equations relate to each other in a coordinate plane. Whether you're tackling homework, preparing for exams, or simply sharpening your problem-solving abilities, mastering the process of solving systems of equations and selecting the correct ordered pair is essential. This guide will walk you through a detailed step-by-step approach to solving the system of equations:

$$ 5x + 2y = 19 $$

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

and then help you determine which of the provided options—A. (3, 5) or B. (5, -3)—satisfies the system.

Understanding the System of Equations

Before diving into the solution, it's crucial to understand what a system of equations is. A system consists of two or more equations with the same variables. The goal is to find the point(s) where the equations intersect, known as the solution(s).

In this case, our system is:

1. Equation 1: $5x + 2y = 19$
2. Equation 2: $4x - 3y = -6$

The solutions are the ordered pairs (x, y) that satisfy both equations simultaneously.

Methods for Solving Systems of Equations

There are several techniques to solve such systems:

- Graphing: Plot both equations on a coordinate plane and find their intersection point.
- Substitution: Solve one equation for one variable and substitute into the other.
- Elimination (Addition or Subtraction): Add or subtract equations to eliminate a variable, making it easier to solve.

For this system, substitution or elimination are most efficient. We'll demonstrate both methods.

Step-by-Step Solution Using the Elimination Method

Step 1: Prepare the equations

Write the equations clearly:

$$ 5x + 2y = 19 \quad (1) $$
$$ 4x - 3y = -6 \quad (2) $$

Step 2: Equalize coefficients for elimination

To eliminate one variable, the coefficients of either x or y should be opposites. Let's eliminate y:

- Multiply Equation (1) by 3:

$$ 3 \times (5x + 2y) = 3 \times 19 $$

$$ 15x + 6y = 57 \quad (3) $$

- Multiply Equation (2) by 2:

$$ 2 \times (4x - 3y) = 2 \times -6 $$

$$ 8x - 6y = -12 \quad (4) $$

Step 3: Add the new equations to eliminate y

Adding Equations (3) and (4):

$$ (15x + 6y) + (8x - 6y) = 57 + (-12) $$

$$ (15x + 8x) + (6y - 6y) = 45 $$

$$ 23x = 45 $$

Step 4: Solve for x

$$ x = \frac{45}{23} $$

This fraction cannot be simplified further.

Step-by-Step Solution Using the Substitution Method

Alternatively, we can solve for y in one equation and substitute into the other for verification.

Step 1: Solve Equation (1) for y:

$$ 5x + 2y = 19 $$

$$ 2y = 19 - 5x $$

$$ y = \frac{19 - 5x}{2} $$

Step 2: Substitute into Equation (2):

$$ 4x - 3\left(\frac{19 - 5x}{2}\right) = -6 $$

Step 3: Simplify and solve for x:

$$ 4x - \frac{3(19 - 5x)}{2} = -6 $$

Multiply through by 2 to clear denominators:

$$ 2 \times 4x - 3(19 - 5x) = -12 $$

$$ 8x - 3(19 - 5x) = -12 $$

Distribute:

$$ 8x - 57 + 15x = -12 $$

Combine like terms:

$$ (8x + 15x) - 57 = -12 $$

$$ 23x - 57 = -12 $$

Add 57 to both sides:

$$ 23x = 45 $$

Same as before, $x = \frac{45}{23}$.

Step 4: Find y:

Plug $x = \frac{45}{23}$ into the expression for y:

$$ y = \frac{19 - 5 \times \frac{45}{23}}{2} $$

Calculate numerator:

$$ 19 - \frac{225}{23} $$

Express 19 as a fraction with denominator 23:

$$ \frac{19 \times 23}{23} - \frac{225}{23} = \frac{437 - 225}{23} = \frac{212}{23} $$

Now, divide by 2:

$$ y = \frac{\frac{212}{23}}{2} = \frac{212}{23} \times \frac{1}{2} = \frac{212}{46} = \frac{106}{23} $$

Final Solution

The solution to the system is:

$$ \boxed{\left(\frac{45}{23}, \frac{106}{23}\right)} $$

This point is approximately $(1.9565, 4.6087)$, which does not match either of the options provided: (3, 5) or (5, -3).

Checking the Given Options

Now, let's verify whether either of the options satisfies both equations.

Option A: (3, 5)

- Substitute into Equation 1:

$$ 5(3) + 2(5) = 15 + 10 = 25 \neq 19 $$

- Since it doesn't satisfy Equation 1, Option A is incorrect.

Option B: (5, -3)

- Substitute into Equation 1:

$$ 5(5) + 2(-3) = 25 - 6 = 19 \quad \checkmark $$

- Substitute into Equation 2:

$$ 4(5) - 3(-3) = 20 + 9 = 29 \neq -6 $$

- Since it doesn't satisfy Equation 2, Option B is incorrect.

Conclusion: Which Option Is Correct?

Given that the exact solution $\left(\frac{45}{23}, \frac{106}{23}\right)$ approximately equals (1.9565, 4.6087), neither of the options (3, 5) nor (5, -3) exactly matches this point.

However, the options provided are likely intended as approximate solutions or to identify the point that approximately satisfies the system.

- Option A (3, 5): Does not satisfy Equation 1 (since it yields 25 instead of 19).

- Option B (5, -3): Satisfies Equation 1 but not Equation 2.

Final Decision:

Since neither option fully satisfies the system, the correct approach is to recognize that the actual solution is approximately (1.9565, 4.6087), which is closest to none of the provided options.

In practice, if you are asked to select the most appropriate option based on approximation, Option A (3, 5) is closer to the actual solution in terms of the x-coordinate, but fails the second equation.

Therefore, the best answer is that neither option is completely correct, but Option A satisfies the first equation, making it partially correct, whereas Option B satisfies the first but not the second.

Key Takeaways

- Solving systems of equations can be done via elimination or substitution.
- Always verify the solutions by substituting back into both equations.
- When options are provided, test each to determine which, if any, satisfy the system.
- Exact solutions may not match approximate options; understanding the process is critical.

Final Tip

Practice solving systems with different methods and verifying solutions carefully. Remember, the goal is not only to find the point where the equations intersect but also to understand the underlying relationships between variables.

Solve The System Of Equations And Choose The Correct Ordered Pair by mastering these steps ensures you're well-equipped to handle similar problems confidently and accurately!

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