

Solve $0.3x - 8 = 0.5x + 10$

Solve $0.3x - 8 = 0.5x + 10$ is a fundamental algebraic equation that students often encounter while learning how to solve for an unknown variable. Understanding how to approach and solve this type of linear equation is essential for building a strong foundation in algebra. Whether you're a student preparing for exams or someone looking to brush up on your math skills, mastering the steps to solve equations like this will enhance your problem-solving abilities and boost your confidence in handling more complex mathematical problems.

Understanding the Equation $0.3x - 8 = 0.5x + 10$

Before diving into solving the equation, it's important to understand what the equation represents and how the variables and constants interact.

Breaking Down the Components

- Variables: The unknown, represented by 'x,' is what you're solving for.
- Coefficients: Numbers multiplying the variable, such as 0.3 and 0.5.
- Constants: Fixed numbers added or subtracted, such as -8 and +10.

This equation is a linear equation because the variable 'x' appears only to the first power, and its graph would be a straight line.

Step-by-Step Guide to Solving $0.3x - 8 = 0.5x + 10$

Solving this equation involves isolating 'x' on one side. The general approach includes moving all variable terms to one side and constants to the other, then solving for 'x.'

Step 1: Subtract $0.3x$ from both sides

This eliminates the variable term on the left:

- $0.3x - 0.3x - 8 = 0.5x - 0.3x + 10$
- Simplifies to: $-8 = 0.2x + 10$

Step 2: Subtract 10 from both sides

To gather constants on one side:

- $-8 - 10 = 0.2x + 10 - 10$
- Simplifies to: $-18 = 0.2x$

Step 3: Divide both sides by 0.2

To solve for 'x':

- $x = -18 \div 0.2$

- $x = -18 \div (2/10)$
- $x = -18 \times (10/2)$
- $x = -18 \times 5$
- $x = -90$

Result: The solution to the equation is $x = -90$.

Verifying the Solution

Verifying your answer ensures that you've solved the equation correctly.

Substitute $x = -90$ into the original equation:

- Left side: $0.3(-90) - 8 = -27 - 8 = -35$
- Right side: $0.5(-90) + 10 = -45 + 10 = -35$

Since both sides equal -35, the solution $x = -90$ is correct.

Additional Methods to Solve Similar Equations

While the above method is straightforward, there are other techniques and tips to efficiently solve similar equations.

Method 1: Using the Balance Method

Treat the equation like a balance scale, performing the same operation on both sides to keep the equation balanced until 'x' is isolated.

Method 2: Combining Like Terms

In equations where multiple 'x' terms or constants are present, combine like terms first before solving.

Method 3: Using Graphing Calculators

Graph the two expressions, $0.3x - 8$ and $0.5x + 10$, and identify the point of intersection, which corresponds to the solution.

Common Mistakes to Avoid When Solving Linear Equations

Being aware of common errors can improve accuracy and confidence.

- **Incorrectly adding or subtracting constants:** Always perform the same operation on both sides.
- **Failing to distribute or combine like terms properly:** Simplify expressions before solving.
- **Dividing by zero:** Ensure the coefficient isn't zero before dividing.
- **Neglecting to check the solution:** Always substitute back into the original equation.

Tips for Mastering Algebraic Equations

- Practice frequently with different types of equations.
- Keep your work organized by writing each step clearly.
- Understand the properties of equality to manipulate equations effectively.
- Use graphing tools for visual understanding of solutions.
- Seek help or tutorials if you're stuck on a particular problem.

Real-Life Applications of Solving Equations Like $0.3x - 8 = 0.5x + 10$

Understanding how to solve such equations isn't just an academic exercise; it has practical applications in various fields.

Financial Calculations

- Calculating interest rates, loan payments, or investment returns often involves solving for unknowns.

Physics and Engineering

- Determining forces, velocities, or other variables in equations modeling real-world systems.

Statistics and Data Analysis

- Finding unknown parameters or predicting outcomes based on algebraic models.

Practice Problems to Reinforce Learning

To solidify your understanding, try solving these similar equations:

1. Solve $0.4x + 5 = 0.6x - 3$

2. Solve $2x - 7 = 3x + 2$

3. Solve $5(0.2x - 1) = 3x + 4$

Check your solutions by substituting the found value of 'x' back into the original equations to verify correctness.

Conclusion

Mastering how to solve equations like $0.3x - 8 = 0.5x + 10$ is a crucial skill in algebra that lays the groundwork for more advanced mathematical concepts. By following systematic steps—isolating variables, combining like terms, and verifying your solutions—you can confidently solve similar equations and apply these techniques to real-world problems. Remember to practice regularly, stay organized, and understand each step's purpose to build a solid mathematical foundation that will serve you well in academics and beyond.

Frequently Asked Questions

How do I solve the equation $0.3x - 8 = 0.5x + 10$?

To solve $0.3x - 8 = 0.5x + 10$, first subtract $0.3x$ from both sides to get $-8 = 0.2x + 10$. Then, subtract 10 from both sides: $-8 - 10 = 0.2x$, which simplifies to $-18 = 0.2x$. Finally, divide both sides by 0.2: $x = -18 / 0.2 = -90$.

What is the value of x in the equation $0.3x - 8 = 0.5x + 10$?

The value of x is -90.

Can you explain the steps to solve $0.3x - 8 = 0.5x + 10$?

Yes. First, subtract $0.3x$ from both sides: $-8 = 0.2x + 10$. Next, subtract 10 from both sides: $-8 - 10 = 0.2x$, resulting in $-18 = 0.2x$. Finally, divide both sides by 0.2: $x = -18 / 0.2 = -90$.

Is the solution to $0.3x - 8 = 0.5x + 10$ equal to -90?

Yes, solving the equation yields $x = -90$.

What are common mistakes to avoid when solving $0.3x - 8 = 0.5x + 10$?

Common mistakes include forgetting to perform the same operation on both sides, mixing up signs when moving terms, or dividing by the wrong coefficient. Always carefully isolate the variable step-by-step.

How can I verify that $x = -90$ is the correct solution for $0.3x - 8 = 0.5x + 10$?

Substitute $x = -90$ back into the original equation: $0.3(-90) - 8 = 0.5(-90) + 10$. Calculate both sides: $-27 - 8 = -45 + 10$, which simplifies to $-35 = -35$. Since both sides are equal, $x = -90$ is correct.

Additional Resources

Mastering the Solution of the Equation $0.3x - 8 = 0.5x + 10$: A Comprehensive Guide

When it comes to algebra, equations like $0.3x - 8 = 0.5x + 10$ are fundamental yet often challenging for students and learners to solve at first glance. Understanding how to approach and solve such equations is crucial for building a strong mathematical foundation. This detailed review delves into every aspect of solving this specific linear equation, exploring methods, step-by-step procedures, common pitfalls, and tips to master similar problems confidently.

Understanding the Equation Structure

Before diving into the solution process, it's essential to understand the composition of the equation:

- The equation is linear in the variable x .
- It involves decimal coefficients: 0.3 and 0.5, which require careful handling during calculations.
- The constants on each side are integers: -8 and 10.

This structure implies a straightforward approach—isolating x by combining like terms and simplifying step by step.

Importance of Recognizing the Equation Type

Knowing that the equation is linear helps determine the method:

- Linear equations feature the variable to the first power, with no exponents or roots.
- They are generally solved by isolating the variable using addition/subtraction, then division.

Recognizing the type ensures you don't overcomplicate the problem with unnecessary methods and highlights that the solution will be unique.

Step-by-Step Solution Process

Let's now carefully walk through solving $0.3x - 8 = 0.5x + 10$.

Step 1: Bring all variable terms to one side

The goal is to gather x terms on one side. To do this:

- Subtract $0.5x$ from both sides:

$$> 0.3x - 0.5x - 8 = 0.5x - 0.5x + 10$$

- Simplify:

$$> (0.3x - 0.5x) - 8 = 0 + 10$$

$$> -0.2x - 8 = 10$$

Step 2: Isolate the variable term

Next, eliminate the constant term -8 from the left side:

- Add 8 to both sides:

$$> -0.2x - 8 + 8 = 10 + 8$$

$$> -0.2x = 18$$

Step 3: Solve for x

Now, divide both sides by -0.2 to isolate x :

$$- x = 18 / (-0.2)$$

Calculating this division:

- Remember that dividing by -0.2 is equivalent to multiplying by -5 (since $1 / -0.2 = -5$):

$$> x = 18 (-5) = -90$$

Result: $x = -90$

Verification of the Solution

Verifying the solution is a critical step to ensure correctness:

- Substitute $x = -90$ back into the original equation:

- > $0.3(-90) - 8 = 0.5(-90) + 10$

- Calculate each side:

- Left Side:

- > $0.3 \cdot -90 = -27$

- > $-27 - 8 = -35$

- Right Side:

- > $0.5 \cdot -90 = -45$

- > $-45 + 10 = -35$

- Both sides equal -35 , confirming $x = -90$ as the correct solution.

Handling Decimal Coefficients: Tips and Tricks

Working with decimals like 0.3 and 0.5 can sometimes complicate calculations. Here are strategies to manage them effectively:

- Convert decimals to fractions:

- $0.3 = \frac{3}{10}$

- $0.5 = \frac{1}{2}$

- Advantages:

- Simplifies multiplication/division.

- Reduces rounding errors.

- Example:

- Rewriting the original step:

- > $0.3x - 8 = 0.5x + 10$

becomes:

$$> (3/10)x - 8 = (1/2)x + 10$$

- When solving, clear denominators by multiplying through by the least common denominator (LCD):

- LCD of 10 and 2 is 10.

- Multiply entire equation by 10:

$$> 10(3/10)x - 108 = 10(1/2)x + 1010$$

$$> 3x - 80 = 5x + 100$$

- Now, solve as a standard linear equation with integers:

- Subtract $5x$:

$$> 3x - 5x - 80 = 5x - 5x + 100$$

$$> -2x - 80 = 100$$

- Add 80:

$$> -2x = 180$$

- Divide both sides by -2 :

$$> x = 180 / -2 = -90$$

This method simplifies calculations and reduces errors, especially when dealing with multiple decimal coefficients.

Common Mistakes to Avoid

While solving such equations, learners often encounter pitfalls. Being aware of these helps prevent errors:

- Incorrect sign handling: Forgetting to change signs when adding or subtracting terms.
- Dividing by decimals directly: Leading to calculation errors; prefer converting to fractions or clearing denominators.
- Neglecting to verify: Always substitute the solution back into the original equation.
- Overlooking the order of operations: Maintain proper order—parentheses, exponents, multiplication/division, addition/subtraction.

Alternative Methods for Solving

Though the algebraic approach described is standard, alternative methods include:

- Graphical Method:
- Plot the two expressions $y = 0.3x - 8$ and $y = 0.5x + 10$.
- The point of intersection corresponds to the solution x .
- Useful for visual understanding and approximate solutions.
- Using a calculator or algebra software:
- Input the equation into graphing calculators or algebra tools to find the intersection point efficiently.

Understanding the Nature of the Solution

For $0.3x - 8 = 0.5x + 10$, the solution is unique because:

- The coefficients of x are different, leading to one intersection point.
- The equation is consistent and solvable.

In contrast, some equations may have:

- No solution (parallel lines in graphical form).
- Infinite solutions (coinciding lines).

Recognizing the type of equation helps in understanding what to expect.

Extending the Concept: Solving Similar Equations

Once comfortable with this specific problem, learners can generalize the approach:

- For equations like $ax + b = cx + d$, follow similar steps:

1. Bring variable terms to one side.
2. Combine like terms.

3. Isolate x by dividing.

- Always check for special cases:

- When coefficients of x are equal and constants are equal, the equations are identities (infinite solutions).

- When coefficients are equal but constants differ, the equations are inconsistent (no solution).

Practical Applications of Solving Such Equations

Understanding how to solve equations like $0.3x - 8 = 0.5x + 10$ extends beyond pure mathematics into real-world applications:

- Financial calculations: Finding break-even points where costs and revenues balance.

- Physics: Solving for unknown quantities like velocity, acceleration, or other parameters modeled by linear equations.

- Engineering: Analyzing systems where relationships are linear and involve decimal coefficients.

- Statistics: Linear models often involve solving similar equations when estimating parameters.

Developing proficiency in solving such equations enhances problem-solving skills across disciplines.

Summary and Final Tips

- Always identify the type of equation before choosing your method.

- Convert decimals to fractions if it simplifies calculations.

- Carefully perform each algebraic step, paying close attention to signs.

- Verify solutions by substituting back into the original equation.

- Practice with similar problems to build confidence and efficiency.

Mastering the solution of $0.3x - 8 = 0.5x + 10$ provides a solid foundation for tackling more complex linear equations. With a systematic approach, attention to detail, and practice, solving such equations becomes a straightforward and rewarding process.

In conclusion, solving $0.3x - 8 = 0.5x + 10$ is a vital skill that exemplifies core algebraic principles. By understanding the structure, applying step-by-step methods, handling decimals wisely, and verifying solutions, learners can confidently approach and solve similar equations. This comprehensive guide

aims to equip you with the knowledge and strategies needed to master these problems and apply them effectively across various mathematical and real-world contexts.

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