

Solve For X $2(4-3x)=20$

Understanding the Equation: Solve For X $2(4-3x)=20$

When faced with the algebraic equation Solve For X $2(4-3x)=20$, it may seem daunting at first glance. However, breaking down the problem into manageable steps allows for a clear path to the solution. This type of equation involves basic algebra principles, including distribution and solving for an unknown variable. Whether you're a student reviewing algebra fundamentals or someone brushing up on problem-solving techniques, understanding how to approach this equation is essential.

In this article, we will explore the detailed methods to solve for x, explain the underlying concepts, and provide step-by-step instructions to reach the solution. By the end, you'll have a comprehensive understanding of how to tackle similar algebraic equations confidently.

Step 1: Understand the Equation Components

Before diving into solving, it's important to understand the structure of the equation:

- The equation is $2(4 - 3x) = 20$.
- It involves a coefficient (2) multiplying a binomial expression $(4 - 3x)$.
- The goal is to find the value of x that satisfies the equation.

This equation is an example of a linear algebraic equation, where the unknown variable appears to the first power and can be isolated through algebraic manipulations.

Step 2: Apply the Distributive Property

The first step in solving the equation is to eliminate the parentheses by distributing the 2 across the terms inside:

- Multiply 2 by 4: $2 \times 4 = 8$
- Multiply 2 by $-3x$: $2 \times -3x = -6x$

This transforms the original equation into:

Distributive step:

$$8 - 6x = 20$$

Step 3: Isolate the Variable Term

Next, aim to get all terms involving x on one side and constants on the other:

- Subtract 8 from both sides to move constants to the right:

$$8 - 6x - 8 = 20 - 8$$

which simplifies to:

$$-6x = 12$$

Step 4: Solve for X

Now, solve for x by dividing both sides of the equation by the coefficient of x (which is -6):

$$-x = 12 / -6$$

- Simplify:

$$x = -2$$

Step 5: Verify the Solution

Always verify your solution by substituting $x = -2$ back into the original equation:

$$\text{Original equation: } 2(4 - 3x) = 20$$

Substitute $x = -2$:

$$2(4 - 3(-2)) = 20$$

Calculate inside the parentheses:

$$4 - 3(-2) = 4 + 6 = 10$$

Now multiply:

$$2 \times 10 = 20$$

Since the left side equals the right side (20), the solution $x = -2$ is verified.

Additional Tips for Solving Similar Equations

To enhance your problem-solving skills, consider the following tips:

- Always distribute first to eliminate parentheses.
- Keep track of negative signs carefully.
- When isolating the variable, perform inverse operations step-by-step.
- Verify solutions by substitution to prevent errors.

Common Mistakes to Avoid

- Forgetting to distribute the coefficient across all terms inside parentheses.
- Making sign errors during subtraction or addition.
- Dividing by a negative number without keeping track of the sign change.
- Forgetting to check the solution by substitution.

Practice Problems to Master Solving for X

Enhance your understanding by practicing with similar equations:

1. Solve for x: $3(2x + 5) = 21$
2. Solve for x: $5(4 - x) = 15$
3. Solve for x: $2(3x - 4) = 10$
4. Solve for x: $-2(x + 3) = 8$
5. Solve for x: $4(2x - 1) = 20$

Try solving these equations using the steps outlined above to reinforce your skills.

Conclusion: Mastering the Art of Solving Algebraic Equations

The process of solving Solve For X $2(4-3x)=20$ exemplifies fundamental algebraic techniques. By systematically distributing, isolating the variable, and verifying solutions, you can confidently approach similar equations. Remember, practice is key to mastering algebra, and understanding each step ensures you build a solid mathematical foundation.

Whether you're preparing for exams, teaching students, or simply improving your math skills, mastering such equations enables you to handle more complex algebraic problems with ease. Keep practicing, stay patient, and you'll find that solving for x becomes an intuitive process over time.

Frequently Asked Questions

How do you start solving the equation $2(4 - 3x) = 20$?

First, distribute the 2 across the parentheses to get $8 - 6x = 20$.

What is the next step after distributing in $2(4 - 3x) = 20$?

Subtract 8 from both sides to isolate the term with x: $-6x = 12$.

How do you solve for x in the equation $-6x = 12$?

Divide both sides by -6 to find x: $x = 12 / -6$, which simplifies to $x = -2$.

What is the solution to the equation $2(4 - 3x) = 20$?

The solution is $x = -2$.

How can I check if $x = -2$ is correct for the equation $2(4 - 3x) = 20$?

Substitute $x = -2$ back into the original equation: $2(4 - 3(-2)) = 2(4 + 6) = 2(10) = 20$, which confirms the solution is correct.

Additional Resources

Solve For X $2(4-3x)=20$: A Deep Dive into Algebraic Problem Solving

Introduction

Mathematics, often regarded as the universal language, provides us with tools and frameworks to understand and interpret the world around us. Among the foundational topics in this discipline is algebra, which introduces us to variables, equations, and the art of solving for unknown quantities. One such algebraic problem that exemplifies these concepts is the equation: $2(4 - 3x) = 20$. While seemingly straightforward, solving this equation involves a series of logical steps that reinforce core algebraic principles. This article aims to thoroughly analyze this problem, exploring methods of solution, potential pitfalls, and the broader significance of mastering such equations in various mathematical contexts.

Understanding the Equation: Breakdown and Context

Before diving into the solution process, it's essential to understand what the equation represents and the significance of each component.

The Equation in Focus

The equation:

$$2(4 - 3x) = 20$$

can be viewed as a simple linear algebraic expression involving a coefficient (2), a binomial expression (4 - 3x), and a constant on the right side (20). The goal is to determine the value of x that makes this statement true.

Context and Applications

While this specific equation might appear as a textbook exercise, similar forms are prevalent across various disciplines:

- Physics: Calculating unknown forces or distances.
- Economics: Determining price points or quantities.
- Engineering: Solving for variables in system models.

Understanding how to isolate the variable x in such equations is vital in these fields, making this a foundational skill for students and professionals alike.

Step-by-Step Solution Process

The process of solving an algebraic equation like $2(4 - 3x) = 20$ involves several logical steps. Each step simplifies the problem closer to isolating x.

Step 1: Distribute the Coefficient

The first step is to eliminate parentheses by distributing the coefficient outside:

$$2 \cdot 4 - 2 \cdot 3x = 20$$

which simplifies to:

$$8 - 6x = 20$$

This distribution applies the distributive property of multiplication over addition/subtraction, a fundamental algebraic principle.

Step 2: Isolate the Variable Term

Next, aim to isolate the term containing x:

Subtract 8 from both sides:

$$8 - 6x - 8 = 20 - 8$$

which simplifies to:

$$-6x = 12$$

This step involves the properties of equality, ensuring the equation remains balanced while moving constants to the other side.

Step 3: Solve for x

Now, divide both sides by the coefficient of x, which is -6:

$$(-6x)/-6 = 12/-6$$

Simplifying yields:

$$x = -2$$

This step employs the division property of equality, which states that dividing both sides of an equation by the same non-zero number maintains equality.

Verification of the Solution

To ensure the solution is accurate, substitute $x = -2$ back into the original equation:

$$2(4 - 3(-2)) = 20$$

Calculate inside the parentheses:

$$4 - 3(-2) = 4 + 6 = 10$$

Now, multiply by 2:

$$2 \cdot 10 = 20$$

Since the left side equals the right side, the solution $x = -2$ is verified.

Broader Implications and Common Challenges

While the steps above are straightforward, solving equations like this can pose challenges, especially for learners new to algebra. Understanding potential pitfalls and common misconceptions can help learners develop stronger problem-solving skills.

Common Challenges

- Distribution Errors: Forgetting to distribute the coefficient properly can lead to incorrect solutions.
- Sign Mistakes: Mismanaging negative signs during subtraction or division can cause errors.
- Dividing by Zero: Ensuring the divisor is not zero; in this case, the divisor is -6, which is valid.

Strategies for Overcoming Challenges

- Practice Distribution: Regularly practice expanding expressions to build confidence.
- Check Signs Carefully: Use visual cues or double-check calculations involving negatives.
- Verify Solutions: Always substitute solutions back into the original equation to confirm accuracy.

Real-World Relevance

Mastering such equations is more than an academic exercise; it enhances critical thinking and analytical skills applicable in data analysis, programming, financial modeling, and scientific research.

Extensions and Variations of the Problem

While the current problem is straightforward, variations can introduce additional complexity, deepening understanding.

1. Equations with Multiple Variables

For example:

$$2(4 - 3x) + 5y = 20$$

This introduces another variable y , leading to systems of equations requiring simultaneous solutions.

2. Equations with Fractions or Exponents

For example:

$$(1/2)(4 - 3x) = 10$$

or

$$2(4 - 3x)^2 = 20$$

which demand different algebraic techniques, such as clearing fractions or employing roots and exponents.

3. Word Problems

Translating real-world scenarios into equations reinforces comprehension and application skills. For instance, if the equation models the number of items sold at a certain price, solving for x could represent finding a break-even point.

Mathematical Significance and Pedagogical Insights

Solving equations like $2(4 - 3x) = 20$ encapsulates the essence of algebra: manipulating symbols to uncover unknowns. It illustrates several key pedagogical principles:

- Stepwise Problem Solving: Breaking down complex problems into manageable steps.
- Logical Reasoning: Ensuring each operation maintains the equation's balance.
- Verification: Reinforcing understanding through substitution checks.

Furthermore, such problems serve as building blocks for more advanced topics like quadratic equations, inequalities, and algebraic functions.

Conclusion: The Value of Mastering Basic Equations

The equation $2(4 - 3x) = 20$ exemplifies fundamental algebraic techniques that underpin much of higher mathematics. Its solution process reinforces core principles like distribution, inverse operations, and verification, all of which are vital skills for students and practitioners across scientific disciplines. Recognizing the step-by-step methodology, understanding common pitfalls, and appreciating the broader applications of such equations can elevate one's mathematical literacy and problem-solving confidence. As we continue to explore more complex mathematical models, mastering these foundational concepts remains essential, empowering us to analyze, interpret, and solve real-world problems with clarity and precision.

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