

Jada Is Solving The Equation Shown Below. Negative One-half $(x + 4) = 6$ Which Is A Possible First Step

Jada Is Solving The Equation Shown Below. Negative One-half $(x + 4) = 6$ Which Is A Possible First Step in her algebra homework, and understanding the correct initial step is crucial for solving the equation accurately. When tackling algebraic equations like this, identifying the best first move can make the entire process smoother and more straightforward. In this article, we'll explore how Jada can approach solving the equation, the possible first steps she can take, and tips for solving similar equations efficiently. Whether you're a student learning algebra or someone looking to brush up on solving equations, this guide will help clarify the steps involved.

Understanding the Equation

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

Breaking Down the Equation

The given equation is:

- **Negative One-half $(x + 4) = 6$**

This equation involves:

- A coefficient of $-1/2$ multiplying the binomial $(x + 4)$
- An equal sign indicating that the expression on the left equals 6

The goal is to isolate the variable x to find its value.

Key Concepts to Recall

To solve this equation, Jada needs to recall:

- How to undo multiplication by a fraction (using multiplication by its reciprocal)
- The importance of performing the same operation on both sides of the equation to maintain equality
- Basic algebraic principles, such as addition, subtraction, multiplication, and division

Possible First Steps in Solving the Equation

Choosing the right first step is vital. In this case, Jada has several options, but some are more efficient than others.

Option 1: Multiply both sides of the equation by -2

This approach is often the most straightforward because it directly cancels out the coefficient of $-1/2$.

Why multiply both sides by -2?

- The coefficient of $(x + 4)$ is $-1/2$
- Multiplying by -2 (which is the reciprocal of $-1/2$) will eliminate the fraction coefficient
- This simplifies the equation, making it easier to solve for x

Step-by-step:

1. Multiply both sides by -2 :
2. $-2 [-1/2 (x + 4)] = -2 6$
3. On the left, $-2 \cdot -1/2 = 1$, so the expression simplifies to $(x + 4)$
4. On the right, $-2 \cdot 6 = -12$
5. Resulting equation: $x + 4 = -12$

Option 2: Divide both sides by $-1/2$

Another possible first step is dividing both sides by $-1/2$, which also cancels the fraction.

Why divide both sides by $-1/2$?

- This operation effectively isolates $(x + 4)$
- It's mathematically equivalent to multiplying both sides by the reciprocal of $-1/2$

Step-by-step:

1. Divide both sides by $-1/2$:

2. $(-1/2(x + 4)) \div (-1/2) = 6 \div (-1/2)$

3. The left simplifies to $(x + 4)$

4. The right becomes $6(-2) = -12$ (since dividing by a fraction is multiplying by its reciprocal)

5. Resulting in: $x + 4 = -12$

Note: Both options lead to the same simplified equation, so either can be used as the first step.

Choosing the Best First Step

When solving equations like this, the most efficient first step is often the one that simplifies the process most directly.

Why multiplying both sides by -2 is recommended

- It cancels the fractional coefficient in a single step
- It avoids dealing with division by fractions, which can be confusing
- It leads to a straightforward algebraic equation: $x + 4 = -12$

Once the equation is simplified, Jada can easily solve for x by subtracting 4 from both sides.

Completing the Solution

After the first step, solving for x becomes more straightforward.

Step-by-step final solution:

1. Start with the simplified equation: $x + 4 = -12$

2. Subtract 4 from both sides to isolate x :

3. $x + 4 - 4 = -12 - 4$

4. Simplifies to: $x = -16$

Result: Jada finds that $x = -16$.

Tips for Solving Similar Equations

To master solving equations like this, keep these tips in mind:

1. Always identify the coefficient of the variable

Knowing whether it's a fraction, whole number, or negative number guides your first step.

2. Use inverse operations

To eliminate multiplication, use division or multiplication by the reciprocal. To eliminate addition or subtraction, use the opposite operation.

3. Perform the same operation on both sides

This maintains the balance of the equation.

4. Simplify step-by-step

Don't rush; simplify each step carefully to avoid mistakes.

5. Check your solution

Substitute your answer back into the original equation to verify correctness.

Conclusion

Jada's first step in solving the equation $-\frac{1}{2}(x + 4) = 6$ is crucial for arriving at the correct solution. The most straightforward initial move is to multiply both sides by -2 , which cancels the fractional coefficient and simplifies the equation to $x + 4 = -12$. From there, she can easily solve for x by subtracting 4 , resulting in $x = -16$. Understanding these foundational algebraic strategies not only helps solve this specific problem but also builds confidence in tackling similar equations in the future. Remember, the key is to choose the most effective first step—usually the one that simplifies the equation most directly—and proceed with systematic, careful steps to find the solution efficiently.

Frequently Asked Questions

What is the first step to solve the equation $-\frac{1}{2}(x + 4) = 6$?

The first step is to eliminate the fraction by multiplying both sides of the equation by -2 .

Why should you multiply both sides by -2 in the equation $-\frac{1}{2}(x + 4) = 6$?

Multiplying by -2 cancels out the fraction, simplifying the equation to eliminate the coefficient of $(x + 4)$.

After multiplying both sides by -2, what is the next step?

The next step is to distribute the -2 to the expression inside the parentheses or simplify accordingly.

Is multiplying both sides of the equation by -2 a valid first step?

Yes, multiplying both sides by -2 is a valid first step to clear the fraction and make the equation easier to solve.

What is the simplified form after multiplying both sides of $-\frac{1}{2}(x + 4) = 6$ by -2?

The simplified form is $x + 4 = -12$.

Can you directly subtract 4 from both sides as a first step?

No, it's better to first eliminate the fraction by multiplying both sides by -2, then proceed to isolate x .

What is an alternative to multiplying both sides by -2 to solve the equation?

An alternative is to multiply both sides by 2 to eliminate the fraction, then adjust signs accordingly.

What does the equation $-\frac{1}{2}(x + 4) = 6$ tell us about the relationship between x and the number 6?

It indicates that half of $(x + 4)$, multiplied by -1, equals 6, helping us find the value of x .

After simplifying the equation, what is the next step to find x ?

Subtract 4 from both sides after simplification to isolate x and solve the equation.

Why is understanding the first step important in solving equations like $-\frac{1}{2}(x + 4) = 6$?

Because choosing the correct first step simplifies the process and prevents mistakes in solving for x efficiently.

Additional Resources

Understanding the First Step in Solving the Equation: $\frac{1}{2}(x + 4) = 6$

When approaching algebraic equations like $\frac{1}{2}(x + 4) = 6$, identifying an effective first step is crucial. This initial move sets the tone for simplifying the problem and ultimately finding the value of x . In this detailed review, we'll explore the various possible first steps, analyze their benefits, and determine which one is most appropriate for this specific equation.

Introduction to Solving Linear Equations

Before diving into the details of the specific equation, it's essential to understand the general process of solving linear equations.

What is a Linear Equation?

- A linear equation is an algebraic equation in which the highest power of the variable (usually x) is 1.
- It typically has the form $ax + b = c$, where a , b , and c are constants, and $a \neq 0$.

Goals When Solving Linear Equations

- Isolate the variable x on one side of the equation.
- Simplify the equation step-by-step to find the value of x .
- Maintain the equality throughout the process by applying inverse operations carefully.

The Given Equation: $\frac{1}{2}(x + 4) = 6$

Let's analyze this specific problem to understand what makes it unique and what potential first steps exist.

Equation Breakdown

- The equation involves a coefficient $\frac{1}{2}$ multiplied by an expression $(x + 4)$.
- The right side of the equation is a simple constant, 6.
- The presence of a fraction coefficient suggests that the first step should focus on removing or simplifying this fraction to make solving more straightforward.

Key Challenges

- Dealing with the fractional coefficient.
- Ensuring the operations applied are valid and maintain the balance of the equation.
- Simplifying the equation effectively to isolate (x) .

Possible First Steps in Solving $\left(-\frac{1}{2}\right)(x + 4) = 6$

When approaching this equation, several initial moves are possible. Let's discuss the most common and their implications.

Option 1: Multiply Both Sides by the Reciprocal of $\left(-\frac{1}{2}\right)$

Explanation:

- Since $\left(-\frac{1}{2}\right)$ is multiplied by $(x + 4)$, one approach is to eliminate this coefficient by multiplying both sides of the equation by the reciprocal of $\left(-\frac{1}{2}\right)$, which is (-2) .

Steps:

1. Multiply both sides of the equation by (-2) :

$$\begin{aligned} & \left[\right. \\ & -2 \times \left(-\frac{1}{2}\right)(x + 4) = -2 \times 6 \\ & \left. \right] \end{aligned}$$

2. Simplify the left side:

$$\begin{aligned} & \left[\right. \\ & \left(-2 \times -\frac{1}{2}\right)(x + 4) = -12 \\ & \left. \right] \end{aligned}$$

Since $(-2 \times -\frac{1}{2} = 1)$, the equation reduces to:

$$\begin{aligned} & \left[\right. \\ & 1 \times (x + 4) = -12 \\ & \left. \right] \end{aligned}$$

3. Simplify further:

$$\begin{aligned} & \left[\right. \\ & x + 4 = -12 \\ & \left. \right] \end{aligned}$$

Advantages:

- This approach directly eliminates the fractional coefficient in one step.
- It simplifies the equation to a linear form that is easy to solve.

Considerations:

- Multiplying both sides by a negative number flips the inequality if it were an inequality, but since this is an equation, it's valid.
- It's a clean and efficient first step that reduces complexity early.

Option 2: Multiply Both Sides by 2 to Clear the Fraction

Explanation:

- Multiplying both sides by 2 targets the denominator of the fractional coefficient, aiming to clear the fraction.

Steps:

1. Multiply both sides by 2:

$$2 \times \left(-\frac{1}{2}(x + 4)\right) = 2 \times 6$$

2. Simplify the left:

$$\left(2 \times -\frac{1}{2}\right)(x + 4) = 12$$

Since $(2 \times -\frac{1}{2} = -1)$, this simplifies to:

$$-1 \times (x + 4) = 12$$

3. Rewrite:

$$-(x + 4) = 12$$

Advantages:

- This step effectively clears the fractional coefficient.
- Simplifies the equation to a form where the main variable is straightforward to isolate.

Considerations:

- The negative sign is now attached to the entire expression, requiring careful handling when solving further.

Option 3: Distribute and Simplify First

Explanation:

- Alternatively, one could distribute the $(-\frac{1}{2})$ across $((x + 4))$ and then proceed.

Steps:

1. Distribute:

$$\begin{aligned} & \\ & -\frac{1}{2} \times x + -\frac{1}{2} \times 4 = 6 \\ & \end{aligned}$$

2. Simplify:

$$\begin{aligned} & \\ & -\frac{1}{2}x - 2 = 6 \\ & \end{aligned}$$

3. Then, add 2 to both sides:

$$\begin{aligned} & \\ & -\frac{1}{2}x = 8 \\ & \end{aligned}$$

4. Multiply both sides by (-2) :

$$\begin{aligned} & \\ & x = -16 \\ & \end{aligned}$$

Advantages:

- This approach breaks the problem down into smaller, manageable steps.
- It provides a clear path to the solution after distributing.

Considerations:

- While distributing is valid, it may be more straightforward to eliminate the fraction first, as in options 1 and 2.

Evaluating the Best First Step: Which Is A Possible First Step?

Having explored multiple options, the question remains: which of these is a possible first step?

Key Point:

A possible first step should be valid algebraically, logically straightforward, and conducive to simplifying the problem efficiently.

Criteria for choosing the best first step:

- Validity: The operation must be mathematically sound.
- Simplicity: It should simplify the equation quickly.
- Efficiency: It should lead to a straightforward path to solving for x .

Analysis of Options:

- Multiplying both sides by -2 :

This directly eliminates the fractional coefficient, leading to a simple linear equation $x + 4 = -12$. It's a strong candidate because it reduces the problem to a simpler form immediately.

- Multiplying both sides by 2:

Also effective in clearing fractions, resulting in $-(x + 4) = 12$. Slightly different in form, but equally valid.

- Distributing first:

While valid, it involves an extra step and slightly more work. It's a good approach but may not be the most efficient initial move.

Conclusion: Which Is The Most Suitable First Step?

Based on the detailed analysis, multiplying both sides by -2 emerges as the most logical and efficient initial step for solving the equation $-\frac{1}{2}(x + 4) = 6$.

Why?

- It directly cancels out the fractional coefficient in one step.
- It simplifies the equation to a very manageable form: $x + 4 = -12$.
- It minimizes the number of operations needed to reach the solution.
- It reduces potential errors associated with distributing or handling fractions separately.

Step-by-Step Solution After the First Move

To illustrate, here's how the entire process unfolds if we choose this as the first step:

1. First Step: Multiply both sides by -2

$$\begin{aligned} & -2 \times \left(-\frac{1}{2}(x + 4)\right) = -2 \times 6 \\ & \end{aligned}$$

2. Simplify:

$$\left(-2 - \frac{1}{2}\right)(x + 4) = -12$$

$$1(x + 4) = -12$$

$$x + 4 = -12$$

3. Next steps:

- Subtract 4 from both sides:

$$x = -12 - 4$$

- Simplify:

$$x = -16$$

This process is efficient, clean, and minimizes the chance for mistakes, making it the recommended first step.

Summary of Key Takeaways

- When solving equations

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