

What Is The Answer To This Multi Step Equation? $2y+29-8y=5$

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Solving multi-step equations can sometimes seem challenging, especially when they involve combining like terms, distributing, or dealing with variables on both sides. In this article, we will explore in detail how to find the solution to the equation $2y + 29 - 8y = 5$. Whether you're a student looking to improve your algebra skills or someone seeking a clear, step-by-step explanation, this guide will walk you through the entire process.

Understanding the Multi-Step Equation

Before diving into solving the specific equation, it's essential to understand what a multi-step equation is and the general approach to solving such problems.

What Is a Multi-Step Equation?

A multi-step equation is an algebraic equation that requires more than one operation to arrive at the solution. These operations typically include:

- Combining like terms
- Moving variables or constants to one side
- Applying inverse operations such as addition/subtraction and multiplication/division

For example, the equation $2y + 29 - 8y = 5$ involves combining like terms and isolating the variable y .

Why Is It Important to Follow a Systematic Approach?

Following a systematic approach ensures accuracy and makes the process manageable. The typical steps involve:

1. Simplify both sides of the equation
2. Collect variable terms on one side
3. Isolate the variable
4. Solve for the variable
5. Verify the solution

Step-by-Step Solution to the Equation $2y + 29 - 8y = 5$

Let's go through each step carefully.

Step 1: Simplify Both Sides of the Equation

The initial equation:

$$2y + 29 - 8y = 5$$

- Look for like terms involving y : $2y$ and $-8y$
- Combine constants: 29 and 5 (though they are on different sides)

First, combine the variable terms:

$$2y - 8y = -6y$$

So, rewriting the equation:

$$-6y + 29 = 5$$

Step 2: Move Constants to One Side

Next, we want to isolate the term with y . To do this, subtract 29 from both sides:

$$-6y + 29 - 29 = 5 - 29$$

Simplify:

$$-6y = -24$$

Step 3: Solve for the Variable y

Now, divide both sides by -6 to solve for y :

$$-6y / -6 = -24 / -6$$

Simplify:

$$y = 4$$

Step 4: Verify the Solution

Always verify your solution by substituting $y = 4$ back into the original equation:

Original equation:

$$2y + 29 - 8y = 5$$

Substitute $y = 4$:

$$2(4) + 29 - 8(4) = 5$$

Calculate step-by-step:

$$- 2(4) = 8$$

$$- 8(4) = 32$$

Plug in:

$$8 + 29 - 32 = 5$$

Simplify:

$$(8 + 29) - 32 = 37 - 32 = 5$$

Since the left side equals the right side, $y = 4$ is indeed the correct solution.

Additional Tips for Solving Multi-Step Equations

To improve your skills and confidence in solving similar equations, consider these helpful tips:

1. Always Simplify First

Combine like terms on both sides as early as possible to simplify the equation.

2. Maintain Balance

Whatever operation you perform on one side, do the same on the other side to keep the equation balanced.

3. Isolate the Variable Step-by-Step

Work systematically to get the variable alone, avoiding skipping steps.

4. Check Your Work

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

5. Practice with Different Equations

The more you practice, the more intuitive solving multi-step equations becomes.

Common Mistakes to Avoid

While solving these equations, keep an eye out for common errors:

- Failing to combine like terms correctly
- Changing the inequality or equation sign accidentally
- Dividing both sides by zero or a variable expression
- Forgetting to verify the solution

Being mindful of these pitfalls will lead to more accurate solutions.

Summary: The Solution to $2y + 29 - 8y = 5$

By following the steps outlined:

- Combining like terms: $2y - 8y = -6y$
- Simplifying the equation: $-6y + 29 = 5$
- Moving constants: $-6y = -24$
- Dividing both sides: $y = 4$
- Verifying: Confirmed that $y = 4$ satisfies the original equation.

Final answer: $y = 4$

Conclusion

Solving multi-step equations like $2y + 29 - 8y = 5$ requires a clear understanding of algebraic operations, attention to detail, and systematic work. Remember to simplify expressions first, move constants appropriately, and carefully isolate the variable. Practice these steps regularly to build confidence and proficiency in solving various types of equations.

Whether you're preparing for exams, helping students, or just honing your math skills, mastering multi-step equations is a fundamental part of algebra. Keep practicing, verify your solutions, and you'll become more comfortable tackling even more complex problems in the future.

Frequently Asked Questions

What is the first step to solve the equation $2y + 29 - 8y = 5$?

Combine like terms on the left side: $2y - 8y + 29 = 5$, which simplifies to $-6y + 29 = 5$.

How do you isolate the variable y in the equation $-6y + 29 = 5$?

Subtract 29 from both sides: $-6y + 29 - 29 = 5 - 29$, resulting in $-6y = -24$.

What is the next step after simplifying to $-6y = -24$?

Divide both sides by -6 to solve for y : $y = (-24) / (-6)$.

What is the value of y in the equation $2y + 29 - 8y = 5$?

$y = 4$, since $(-24)/(-6) = 4$.

Why do we combine like terms in multi-step equations?

To simplify the equation and make it easier to isolate the variable and solve for it.

Can you verify the solution $y = 4$ in the original equation?

Yes. Substitute $y = 4$ into the original equation: $2(4) + 29 - 8(4) = 8 + 29 - 32 = 5$, which confirms the solution.

What common mistakes should be avoided when solving multi-step equations like this?

Avoid errors in combining like terms, forgetting to perform the same operation on both sides, and miscalculating the division step.

Is the equation $2y + 29 - 8y = 5$ linear or quadratic?

It's a linear equation because the highest power of y is 1.

How can understanding multi-step equations help in real-world problem solving?

They teach logical thinking, problem-solving skills, and how to systematically isolate variables, which are useful in various real-life situations like budgeting or engineering.

What is the overall process to solve multi-step equations like this one?

The process involves simplifying both sides, combining like terms, isolating the variable through inverse operations, and verifying the solution by substitution.

Additional Resources

Understanding and Solving the Multi-Step Equation: $2y + 29 - 8y = 5$

Mathematics often presents us with equations that require several steps to simplify and solve. Multi-step equations, such as the one we're examining today— $2y + 29 - 8y = 5$ —are fundamental in algebra and serve as building blocks for more complex problem-solving. In this comprehensive review, we'll explore the nature of this equation, how to approach it systematically, and the reasoning behind each step to arrive at the correct solution.

Introduction to Multi-Step Equations

Before delving into the specific problem, it's essential to understand what constitutes a multi-step equation.

What Is a Multi-Step Equation?

A multi-step equation is an algebraic expression that involves two or more operations—such as addition, subtraction, multiplication, or division—to isolate the variable and find its value. Unlike simple one-step equations (e.g., $x + 3 = 7$), multi-step equations require multiple manipulations to isolate the variable.

Characteristics of multi-step equations:

- They often contain like terms involving the variable.
- They may include constants on both sides of the equation.
- They may involve parentheses, requiring distribution.
- They require combining like terms before isolating the variable.

Why Are Multi-Step Equations Important?

Mastering multi-step equations is crucial because:

- They lay the groundwork for solving real-world problems involving multiple relationships.
- They develop algebraic thinking and problem-solving skills.
- They help in understanding linear equations and their solutions.

Breaking Down the Equation: $2y + 29 - 8y = 5$

Let's analyze the specific equation:

$$2y + 29 - 8y = 5$$

This equation contains:

- Terms involving the variable y : $2y$ and $-8y$.
- Constant term: 29 .
- Constants on both sides (the right side is 5).

Step 1: Recognize Like Terms and Simplify

First, identify and combine like terms on the left side:

- The terms $2y$ and $-8y$ are like terms because they both contain y .

Combine:

$$2y - 8y = -6y$$

Now, the equation simplifies to:

$$-6y + 29 = 5$$

This is an essential step because combining like terms reduces the complexity and brings the equation closer to the standard form where the variable is isolated.

Systematic Approach to Solving the Equation

Once simplified, the goal is to isolate y . The typical steps involve:

1. Removing constant terms from the side with the variable.
2. Isolating the variable term.
3. Solving for y by dividing both sides by the coefficient of y .

Let's walk through these steps carefully.

Step 2: Eliminate the Constant Term on the Left Side

Subtract 29 from both sides to move constants away from the variable:

$$-6y + 29 - 29 = 5 - 29$$

Simplify:

$$\text{- Left side: } -6y + (29 - 29) = -6y + 0 = -6y$$

$$\text{- Right side: } 5 - 29 = -24$$

Result:

$$-6y = -24$$

Step 3: Solve for y

To isolate y , divide both sides by the coefficient of y , which is -6:

$$y = \frac{-24}{-6}$$

Simplify:

$$y = 4$$

This is the solution to the equation.

Verifying the Solution

It's good practice to verify your solution by substituting $y = 4$ back into the original equation:

Original Equation: $2y + 29 - 8y = 5$

Substitute $y = 4$:

$$2(4) + 29 - 8(4) = 5$$

Calculate each term:

$$- 2(4) = 8$$

$$- 8(4) = 32$$

Now:

$$8 + 29 - 32 = 5$$

Combine:

$$8 + 29 = 37$$

$$37 - 32 = 5$$

Since the left side equals the right side, the solution $y = 4$ is verified as correct.

Deeper Insights Into the Solution Process

Understanding each step in solving the equation enhances comprehension and prepares you for more complex problems.

Why Simplify Like Terms First?

Combining like terms reduces the number of terms and simplifies the structure, making the equation easier to manipulate. It prevents errors and makes subsequent steps more straightforward.

Importance of Maintaining Balance

Every algebraic step must keep the equation balanced. For example, when subtracting 29 from both sides, you perform the same operation on both sides to maintain equality.

Handling Coefficients and Variables

Dividing both sides by the coefficient of y ensures that y is alone. Remember, if the coefficient were a fraction, you'd multiply both sides by its reciprocal.

Common Mistakes to Avoid

While solving multi-step equations is straightforward in theory, common pitfalls can lead to errors:

- Forgetting to perform the same operation on both sides: Always perform inverse operations equally on both sides.
- Incorrectly combining like terms: Be sure to combine only similar terms involving the same variable or constants.
- Sign errors: Watch out for negative signs, especially when distributing or subtracting.
- Dividing by zero: Ensure the coefficient of the variable isn't zero; otherwise, the equation has no solution or infinitely many solutions.

Practical Applications of Solving Multi-Step Equations

Mastering equations like $2y + 29 - 8y = 5$ isn't just an academic exercise; it has real-world implications:

- Financial calculations: Calculating interest, profit, or budgeting where multiple factors interact.
- Engineering problems: Analyzing systems with multiple variables.
- Physics: Solving for unknowns in motion or energy equations.
- Data analysis: Deriving unknowns from combined data sets.

Summary of the Solution Steps

To recap, the process to solve $2y + 29 - 8y = 5$ involves:

1. Combine like terms: $2y - 8y = -6y$
2. Simplify the equation: $-6y + 29 = 5$
3. Subtract 29 from both sides: $-6y = -24$
4. Divide both sides by -6: $y = 4$
5. Verify the solution by substituting back into the original equation.

Final Thoughts and Tips for Solving Multi-Step Equations

- Always simplify first: combine like terms and remove parentheses if present.
 - Maintain balance: perform the same operation on both sides.
 - Isolate the variable step-by-step: undo addition/subtraction first, then multiplication/division.
 - Check your work: verify solutions by substitution.
 - Practice with varied problems to build confidence.
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Conclusion

The answer to the multi-step equation $2y + 29 - 8y = 5$ is $y = 4$. Through systematic application of algebraic principles—combining like terms, isolating the variable, and verifying solutions—we arrive at this conclusion confidently. Mastering such problems enhances your mathematical reasoning and prepares you for tackling more complex algebraic challenges. Remember, understanding each step deeply not only helps in solving specific equations but also develops a solid foundation for advanced mathematics and real-world problem-solving.

In summary, solving multi-step equations involves careful analysis, methodical application of algebraic operations, and verification. With practice, these problems become intuitive, empowering you to handle increasingly complex equations with ease.

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