

2(4y-9)=14 Solve For Y

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When it comes to algebraic equations, understanding how to solve for an unknown variable is a fundamental skill that lays the groundwork for more advanced mathematics. One such equation that students often encounter is $2(4y-9) = 14$. Solving for y involves applying various algebraic principles such as distributive property, combining like terms, and isolating the variable. This article provides a comprehensive, step-by-step guide to solving the equation $2(4y-9) = 14$ for y , along with tips, explanations, and related concepts to deepen your understanding.

Understanding the Equation: $2(4y-9) = 14$

Before diving into the solution, it's essential to understand what this equation represents. The equation $2(4y-9) = 14$ involves a multiplication of 2 with the binomial $(4y - 9)$, which is set equal to 14. Our goal is to find the value of y that makes this equation true.

Key components:

- Coefficients: Numbers multiplied by variables (e.g., 2 and 4)
- Variables: Letters representing unknown values (here, y)
- Constants: Fixed numbers (here, -9 and 14)

Understanding the structure:

The equation involves a distributive operation, which suggests that we'll need to use the distributive property to simplify before solving.

Step-by-Step Solution for $2(4y-9) = 14$

Let's explore the process of solving the equation step by step:

Step 1: Apply the Distributive Property

The distributive property states that:

$$a(b + c) = ab + ac$$

In our case, $a = 2$, $b = 4y$, $c = -9$

Applying this:

$$2(4y - 9) = (2)(4y) + (2)(-9) = 8y - 18$$

So, the original equation becomes:

$$8y - 18 = 14$$

Step 2: Isolate the term with y

The goal now is to get y on one side of the equation. To do this, add 18 to both sides to cancel out the -18:

$$8y - 18 + 18 = 14 + 18$$

Simplify both sides:

$$8y = 32$$

Step 3: Solve for y

Divide both sides by 8 to isolate y:

$$y = 32 \div 8$$

Simplify:

$$y = 4$$

Answer: y equals 4

Verification of the Solution

Always verify your solution by substituting the value of y back into the original equation.

Substitute $y = 4$ into $2(4y - 9) = 14$:

$$2(4 \cdot 4 - 9) = 14$$

Calculate inside the parentheses:

$$2(16 - 9) = 14$$

Simplify:

$$2(7) = 14$$

Multiply:

$$14 = 14$$

Since both sides are equal, $y = 4$ is the correct solution.

Additional Tips for Solving Similar Equations

Understanding the steps above can help you solve a variety of similar algebraic equations. Here are some helpful tips:

- **Always apply the distributive property first** when the equation involves parentheses multiplied by a coefficient.
- **Combine like terms** on each side of the equation to simplify the problem.
- **Isolate the variable** by undoing addition/subtraction before multiplication/division.
- **Check your solution** by substituting the found value back into the original equation.

- **Be cautious with negative signs** and ensure they are properly distributed and canceled out.

Common Mistakes to Avoid When Solving Such Equations

While solving algebraic equations might seem straightforward, some common errors can lead to incorrect answers:

1. **Skipping the distributive step** and trying to solve without expanding parentheses.
2. **Forgetting to distribute the coefficient across all terms inside parentheses.**
3. **Incorrectly adding or subtracting constants** from both sides.
4. **Dividing by zero**— always check that the divisor is not zero.
5. **Not verifying the solution** after solving, which can lead to unnoticed mistakes.

Related Concepts in Algebra

Understanding how to solve $2(4y - 9) = 14$ opens the door to many other algebraic topics, including:

- **Linear equations:** Equations where the variable appears to the first power.
- **Distributive property:** Essential for expanding expressions.
- **Solving equations with variables on both sides:** Involves additional steps like combining like terms.
- **Inequalities:** Similar to equations, but involve inequality signs ($<$, $>$, $\leq$, $\geq$).

- **Word problems:** Applying algebra to real-world scenarios.

Practice Problems for Mastery

To reinforce your understanding, try solving these similar problems:

1. Solve for y : $3(2y + 5) = 27$
2. Solve for x : $5(x - 4) = 35$
3. Determine z in: $4(z + 3) = 20$
4. Solve for a : $2(3a - 7) + 4 = 20$

Conclusion

Mastering how to solve equations like $2(4y - 9) = 14$ is vital for advancing in algebra and mathematics as a whole. The key steps involve applying the distributive property, combining like terms, and isolating the variable through inverse operations. Remember to verify your solutions and practice similar problems to build confidence. With consistent practice and attention to detail, you will develop strong algebraic problem-solving skills that can be applied to more complex equations and real-world applications.

Frequently Asked Questions

How do I solve the equation $2(4y - 9) = 14$ for y ?

First, distribute the 2 across the parentheses: $8y - 18 = 14$. Then, add 18 to both sides: $8y = 32$. Finally, divide both sides by 8: $y = 4$.

What is the first step in solving $2(4y - 9) = 14$?

The first step is to distribute the 2 to both terms inside the parentheses, resulting in $8y - 18 = 14$.

How do I isolate y after distributing in the equation $2(4y - 9) = 14$?

After distribution, add 18 to both sides to get $8y = 32$, then divide both sides by 8 to find $y = 4$.

Can I check my solution $y = 4$ in the original equation?

Yes. Substitute $y = 4$ into the original equation: $2(4 \cdot 4 - 9) = 14$. Calculate inside the parentheses: $4 \cdot 4 = 16$, so $16 - 9 = 7$. Then, $2 \cdot 7 = 14$, which matches the right side, so $y = 4$ is correct.

What is the importance of distributing in solving the equation $2(4y - 9) = 14$?

Distributing simplifies the equation by removing parentheses, making it easier to isolate the variable y and solve for its value.

Additional Resources

Understanding and Solving the Equation $2(4y - 9) = 14$: A Comprehensive Guide

When approaching algebraic equations like $2(4y - 9) = 14$, students often encounter challenges in isolating the variable and understanding the steps involved. This detailed review aims to demystify the process, break down each component of the equation, and provide a thorough understanding of how to solve for y . Whether you're a beginner or brushing up on your algebra skills, this guide offers clarity, strategies, and insights to master this problem.

Introduction to the Equation

The equation $2(4y - 9) = 14$ is a linear algebraic expression involving a single variable y . It combines multiplication, subtraction, and a constant, making it an excellent example to understand the fundamental techniques of solving linear equations.

- Key features of the equation:
- It involves a distributive multiplication, indicated by the parentheses.
- The goal is to isolate y on one side of the equation.
- The constants and coefficients are straightforward, making it suitable for practicing core algebra skills.

Breaking Down the Equation

Before jumping into solving, it helps to understand each part:

The Left Side: $2(4y - 9)$

- This expression indicates that the entire quantity $(4y - 9)$ is being multiplied by 2.
- The parentheses denote that the multiplication applies to the entire expression inside.
- To simplify, the distributive property will be used, which states:

$$\begin{aligned} & \backslash[\\ & a(b + c) = ab + ac \\ & \backslash] \end{aligned}$$

- Applying distributive property:

$$\begin{aligned} & \backslash[\\ & 2(4y - 9) = 2 \times 4y - 2 \times 9 \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ & = 8y - 18 \\ & \backslash] \end{aligned}$$

The Right Side: 14

- A constant value, serving as the target for the simplified expression on the left.

Step-by-Step Solution Process

The process of solving $2(4y - 9) = 14$ involves several systematic steps:

Step 1: Expand the Left Side Using Distributive Property

- As explained above:

$$\begin{aligned} & \backslash[\\ & 2(4y - 9) = 8y - 18 \\ & \backslash] \end{aligned}$$

- The equation now becomes:

$$8y - 18 = 14$$

Step 2: Isolate the Term with (y)

- To do this, add 18 to both sides to move constants to the right:

$$8y - 18 + 18 = 14 + 18$$

$$8y = 32$$

Step 3: Solve for (y)

- Divide both sides by 8 to isolate (y) :

$$\frac{8y}{8} = \frac{32}{8}$$

$$y = 4$$

Final Answer: $(y = 4)$

This is the solution to the equation.

Verification of the Solution

After finding $(y = 4)$, it's essential to verify the solution by substituting it back into the original equation:

$$2(4 \times 4 - 9) = 14$$

Calculate inside parentheses:

$$4 \times 4 = 16$$

\]

\[
16 - 9 = 7
\]

Multiply by 2:

\[
2 \times 7 = 14
\]

Since both sides equal 14, the solution $(y = 4)$ is verified as correct.

Deeper Understanding of Each Step

Understanding why each step works enhances problem-solving skills and builds mathematical confidence.

1. Distributive Property

- The distributive property is fundamental in algebra for removing parentheses when a factor multiplies an expression inside parentheses.
- Recognizing when and how to apply it is crucial.

2. Combining Like Terms

- Once expanded, combining like terms simplifies the expression.
- In this case, there was only one term with (y) and one constant.

3. Inverse Operations

- Addition and subtraction are inverse operations.
- To isolate (y) , we perform inverse operations in reverse order:
- First, eliminate constants by addition/subtraction.
- Then, eliminate coefficients by division/multiplication.

4. Maintaining Equation Balance

- Every operation performed on one side must be performed on the other to keep the equation balanced.
- This principle ensures the equality holds throughout the steps.

Common Mistakes and How to Avoid Them

While solving equations like this, students often encounter pitfalls. Being aware of these can prevent errors:

Mistake	Explanation	Solution
Forgetting to distribute	Missing the multiplication over parentheses leads to incorrect steps.	Carefully apply the distributive property before simplifying.
Incorrect signs	Sign errors during subtraction or addition.	Pay close attention to signs and double-check each operation.
Dividing before simplifying	Dividing coefficients prematurely can cause confusion.	Complete distribution and simplification first.
Skipping verification	Not substituting back to verify leads to unconfirmed solutions.	Always verify by substitution.

Additional Approaches and Variations

While the straightforward method involves distribution and inverse operations, alternative strategies can be used for similar equations:

- Using Algebraic Manipulation Without Distribution
 - For more complex equations, sometimes factoring or substitution might be more efficient.
 - Graphical Solution
 - Plot the functions $y = \frac{14}{2}$ and see where it intersects with the line derived from the original expression.
 - Solving Similar Equations
 - Equations like $a(bx + c) = d$ can be approached similarly, emphasizing the importance of understanding each step.
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Practice Problems for Mastery

To reinforce learning, here are some practice problems with solutions:

Problem 1: Solve $3(2y + 5) = 27$

Solution:

- Distribute:

$$3 \times 2y + 3 \times 5 = 6y + 15$$

- Set equal to 27:

$$6y + 15 = 27$$

- Subtract 15:

$$6y = 12$$

- Divide by 6:

$$y = 2$$

- Verify:

$$3(2 \times 2 + 5) = 3(4 + 5) = 3 \times 9 = 27$$

Problem 2: Solve $4(3y - 2) = 20$

Solution:

- Distribute:

$$4 \times 3y - 4 \times 2 = 12y - 8$$

- Set equal to 20:

$$12y - 8 = 20$$

- Add 8:

$$\begin{aligned} & \backslash[\\ & 12y = 28 \\ & \backslash] \end{aligned}$$

- Divide by 12:

$$\begin{aligned} & \backslash[\\ & y = \frac{28}{12} = \frac{7}{3} \\ & \backslash] \end{aligned}$$

- Verify:

$$\begin{aligned} & \backslash[\\ & 4(3 \times \frac{7}{3} - 2) = 4(7 - 2) = 4 \times 5 = 20 \\ & \backslash] \end{aligned}$$

Real-World Applications of Solving Equations

Understanding how to solve equations like $2(4y - 9) = 14$ has practical implications beyond classroom exercises:

- Engineering: Calculating forces or materials quantities.
- Economics: Determining profit or cost functions.
- Computer Science: Algorithm analysis involving algebraic formulas.
- Physics: Solving for unknowns in motion or energy equations.

Conclusion: Mastery of the Equation and Beyond

Solving $2(4y - 9) = 14$ exemplifies fundamental algebraic techniques pivotal for higher-level mathematics and practical problem-solving. The key takeaways include:

- Carefully applying the distributive property.
- Performing inverse operations systematically.
- Verifying solutions to ensure accuracy.
- Recognizing common pitfalls and avoiding them.

Mastering such equations fosters a strong foundation in algebra, enabling students to tackle more complex problems with confidence. Remember, practice and understanding go hand in hand—so keep practicing similar problems, and you'll develop both skill and intuition for algebraic solutions.

Happy solving!

[2 4y 9 14 Solve For Y](#)

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