

Solve $8a + 15 + 6a + 3a = 85$

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If you're working on algebraic equations, solving for the variable often involves simplifying and isolating the unknown. The expression $8a + 15 + 6a + 3a = 85$ appears to be a typical algebraic problem that requires combining like terms and solving for a . In this comprehensive guide, we'll walk through the step-by-step process of solving this equation, explore related algebra concepts, provide tips for mastering similar problems, and optimize the content for search engines to help learners and students find the information they need efficiently.

Understanding the Equation: Break Down the Components

Before diving into the solution, it's important to understand what the equation represents and identify the key components.

What does the equation look like?

The original equation is:

```
```plaintext
8a + 15 + 6a + 3a = 85
```
```

However, there appears to be a missing operator (such as plus or minus) between $8a$ and 15 . To proceed accurately, let's assume the correct form is:

```
```plaintext
8a + 15 + 6a + 3a = 85
```
```

This is a common scenario in algebra where some operators are omitted, and part of solving the problem includes interpreting the intended expression.

Clarifying the expression

- Operators: The missing operator between $8a$ and 15 is likely a plus sign.
- Expression components:
 - Terms with variable: $8a$, $6a$, $3a$
 - Constant term: 15
 - Total sum: 85

Step-by-Step Solution of the Equation

Now that we understand the structure, let's proceed through each step to solve for a.

Step 1: Write the simplified equation

Starting with:

```
```plaintext
8a + 15 + 6a + 3a = 85
```
```

Step 2: Combine like terms

Identify the terms involving a:

- 8a, 6a, and 3a

Add them:

```
```plaintext
8a + 6a + 3a = (8 + 6 + 3)a = 17a
```
```

Now the equation becomes:

```
```plaintext
17a + 15 = 85
```
```

Step 3: Isolate the term with the variable

Subtract 15 from both sides:

```
```plaintext
17a + 15 - 15 = 85 - 15
```
```

Simplifies to:

```
```plaintext
17a = 70
```
```

Step 4: Solve for a

Divide both sides by 17:

```
```plaintext
a = 70 / 17
```
```

Simplify or leave as a fraction:

``plaintext
a = 70/17
``

Final answer:

``plaintext
a = 70/17
``

which is approximately 4.1176 when expressed as a decimal.

Understanding the Solution Process

Let's explore the key concepts involved in solving this type of algebraic equation.

Combining Like Terms

- Identifies terms with the same variable and combines their coefficients.
- Simplifies the equation to a more manageable form.

Isolating the Variable

- The main goal in solving for a is to get a alone on one side of the equation.
- Achieved through addition, subtraction, multiplication, or division.

Working with Fractions and Decimals

- Sometimes solutions are fractions; understanding how to interpret and simplify them is crucial.
- Converting to decimal form provides approximate solutions.

Tips for Solving Similar Algebraic Equations

To master solving equations like $8a + 15 + 6a + 3a = 85$, consider these tips:

1. Carefully Identify All Terms and Operators

- Ensure all operators are present and correctly interpreted.

- Clarify unclear expressions before proceeding.

2. Simplify Step-by-Step

- Always combine like terms early to reduce complexity.
- Keep equations balanced by performing the same operation on both sides.

3. Use Inverse Operations

- Addition $\leftrightarrow$ Subtraction
- Multiplication $\leftrightarrow$ Division

4. Check Your Work

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

5. Practice with Variations

- Solve equations involving different operations, variables, and constants to strengthen understanding.

Common Mistakes to Avoid

While solving algebraic equations, students often encounter pitfalls. Here are some common mistakes and how to avoid them:

1. Ignoring the Missing Operator

- Always verify the original expression for missing signs or operators.

2. Forgetting to Combine Like Terms

- Make sure all terms involving the variable are combined before solving.

3. Incorrectly Isolating the Variable

- Perform inverse operations carefully and in the correct order.

4. Not Checking the Solution

- Always substitute your answer back into the original equation to confirm.

Additional Examples and Practice Problems

Practice is essential for mastering algebra. Here are some similar problems to try:

Example 1: Solve for a in the equation:

```
```plaintext
5a + 10 + 3a = 40
```
```

Example 2: Solve for x in:

```
```plaintext
2x - 4 + x = 10
```
```

Example 3: Solve the equation:

```
```plaintext
7a + 3 = 2a + 18
```
```

Solutions:

- Example 1:

1. Combine like terms: $5a + 3a = 8a$
2. Equation: $8a + 10 = 40$
3. Subtract 10: $8a = 30$
4. Divide by 8: $a = 30/8 = 15/4 = 3.75$

- Example 2:

1. Combine like terms: $2x + x = 3x$
2. Equation: $3x - 4 = 10$
3. Add 4: $3x = 14$
4. Divide by 3: $x = 14/3 \approx 4.6667$

- Example 3:

1. Subtract 2a from both sides: $7a - 2a + 3 = 18$
2. Simplify: $5a + 3 = 18$

3. Subtract 3: $5a = 15$

4. Divide by 5: $a = 15/5 = 3$

Conclusion: Mastering Algebraic Equations

Solving algebraic equations like $8a + 15 + 6a + 3a = 85$ involves understanding the structure of the equation, combining like terms, and applying inverse operations to isolate the variable. Whether dealing with fractions, decimals, or more complex expressions, the core principles remain the same: simplify step-by-step, check your work, and practice regularly.

By following the detailed process outlined above and practicing similar problems, learners can develop confidence and proficiency in solving algebraic equations. Remember that clarity and systematic steps are key to success in algebra, and always verify your solutions for accuracy.

SEO Keywords for Better Search Visibility

- How to solve algebraic equations
- Solving for a in algebra
- Combine like terms in equations
- Algebraic equation examples
- Solving equations with fractions
- Step-by-step algebra solutions
- Algebra practice problems
- Tips for solving equations
- Basic algebra tutorial
- Solving linear equations

By understanding and practicing these concepts, you'll improve your algebra skills and become more comfortable solving various types of equations. Keep practicing, stay patient, and you'll master solving equations like the one discussed in this guide!

Frequently Asked Questions

How do I simplify the equation $8a + 15 + 6a + 3a = 85$?

Combine like terms: $8a + 6a + 3a = 17a$. So, the equation becomes $17a + 15 = 85$.

What is the first step to solve for 'a' in the equation $17a + 15 = 85$?

Subtract 15 from both sides to isolate the term with 'a': $17a = 85 - 15$.

How do I find the value of 'a' after simplifying the equation $17a = 70$?

Divide both sides by 17: $a = 70 / 17$.

What is the exact value of 'a' in the equation $17a + 15 = 85$?

$a = 70 / 17$, which is approximately 4.12 when expressed as a decimal.

Are there any common mistakes to avoid when solving for 'a' in this type of equation?

Yes, avoid forgetting to combine like terms correctly and ensure to perform the same operation on both sides of the equation, especially subtraction and division steps.

How can I check if my solution for 'a' is correct in the equation $8a + 15 + 6a + 3a = 85$?

Substitute the value of 'a' back into the original equation and verify if both sides are equal. For example, plug in $a \approx 4.12$ and see if the left side equals 85.

Additional Resources

Solve $8a + 15 + 6a + 3a = 85$: A Comprehensive Step-by-Step Guide to Mastering Algebraic Equations

When it comes to algebra, equations like solve $8a + 15 + 6a + 3a = 85$ are fundamental building blocks that help develop critical thinking and problem-solving skills. Such equations may seem intimidating at first glance, but with a clear step-by-step approach, they become manageable puzzles waiting to be unraveled. This guide aims to demystify the process, offering a detailed walkthrough for solving these types of linear equations efficiently and confidently.

Understanding the Equation

Before diving into the solution, let's analyze the given equation:

$$8a + 15 + 6a + 3a = 85$$

This equation involves:

- Multiple terms with the variable a
- Constant term 15
- An equal sign indicating the balance of the equation

Key objectives:

- Combine like terms to simplify
- Isolate the variable a
- Find the value of a that satisfies the equation

Step 1: Recognize and Group Like Terms

The first step in solving the equation is to identify like terms, which are terms that contain the same variable raised to the same power—in this case, a.

In the equation, we have:

- Terms with a: 8a, 6a, 3a
- Constant term: 15

Grouping like terms:

- Combine all a terms to simplify the left side
- Keep the constant term separate for now

Step 2: Combine Like Terms

Adding the coefficients of the a terms:

$$8a + 6a + 3a = (8 + 6 + 3)a = 17a$$

Now, rewrite the original equation with this simplified expression:

$$17a + 15 = 85$$

This step reduces the complexity, making it easier to move forward.

Step 3: Isolate the Variable Term

To solve for a, the next step is to isolate the term containing a on one side of the equation.

Subtract 15 from both sides:

$$17a + 15 - 15 = 85 - 15$$

Simplifies to:

$$17a = 70$$

Step 4: Solve for the Variable

Now, divide both sides of the equation by 17 to find a:

$$a = 70 / 17$$

Expressed as a simplified fraction, $a = 70/17$.

Step 5: Express the Solution

The exact solution is:

$$a = 70/17$$

If you prefer decimal form:

$$a \approx 4.1176 \text{ (rounded to four decimal places)}$$

Additional Tips for Solving Similar Equations

- Always combine like terms first to simplify the equation.
- Perform inverse operations to isolate the variable (addition/subtraction first, then multiplication/division).
- Check your solution by substituting the value of a back into the original equation.
- Be cautious with fractions—simplify where possible to keep calculations straightforward.

Practice Problems for Mastery

1. Solve: $5b + 2 + 3b = 20$
2. Solve: $10x - 4 + 6x = 52$
3. Solve: $2m + 3 + 4m + 5 = 30$

Attempting these problems will reinforce your understanding of combining like terms, isolating variables, and solving linear equations.

Why Understanding These Steps Matters

Mastering the process of solving equations like $8a + 15 + 6a + 3a = 85$ is more than just academic; it builds essential skills for higher mathematics, science, engineering, economics, and everyday problem-solving. Recognizing patterns, simplifying expressions, and systematically working through steps are universal skills applicable across numerous disciplines.

Summary of the Solution Process

| Step | Action | Result |
|------|-----------------------------------|--|
| 1 | Recognize like terms | Terms with a: $8a$, $6a$, $3a$; constants: 15 |
| 2 | Combine like terms | $17a + 15 = 85$ |
| 3 | Subtract constant from both sides | $17a = 70$ |
| 4 | Divide both sides by coefficient | $a = 70/17$ |
| 5 | (Optional) Convert to decimal | $a \approx 4.1176$ |

Final Thoughts

Solving equations like $8a + 15 + 6a + 3a = 85$ becomes second nature once you understand the core principles: combining like terms, performing inverse operations, and systematically isolating the variable. This process not only helps in academic settings but also sharpens logical thinking and analytical skills that are valuable in real-world scenarios. Keep practicing with different types of equations, and you'll find that these methods become intuitive, empowering you to tackle even more complex problems with confidence.

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