

What Is The Sum Of These Expressions: $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$

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Understanding how to simplify algebraic expressions is fundamental in mathematics, especially when dealing with multiple variables. The question "What is the sum of these expressions: $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$ " presents an excellent opportunity to explore the process of combining like terms, handling coefficients, and simplifying algebraic expressions for clarity and further use. This article will walk you through the detailed steps involved in solving this problem, explain key concepts in algebra, and provide tips for tackling similar problems efficiently.

Breaking Down the Problem: Understanding the Expressions

Before diving into the calculations, it is essential to understand the structure of the given expressions.

The Expressions to Add

The two algebraic expressions are:

1. First Expression: $-3.5t - 4s + 4.5$
2. Second Expression: $-7.1 - 0.3s + 4.1t$

The goal is to find their sum, which involves combining like terms—terms that contain the same variables raised to the same powers.

Variables and Constants

In these expressions, we encounter:

- Variables: t and s
- Constants: numbers without variables, such as 4.5 and -7.1

When adding these expressions, only like terms—those with the same variables—are combined. Constants are combined separately.

Step-by-Step Solution Approach

To find the sum of the two expressions, follow these steps:

1. Write the expressions clearly

Express the sum as:

$$\begin{aligned} & \\ & (-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t) \\ & \end{aligned}$$

2. Remove parentheses

Since both expressions are added, the parentheses can be removed, but keep the signs in mind:

$$\begin{aligned} & \\ & -3.5t - 4s + 4.5 - 7.1 - 0.3s + 4.1t \\ & \end{aligned}$$

3. Group like terms

Group all terms containing the same variables and constants:

- Terms with t: $(-3.5t)$ and $(4.1t)$
- Terms with s: $(-4s)$ and $(-0.3s)$
- Constants: (4.5) and (-7.1)

4. Combine like terms

Adding the coefficients of similar terms:

For t:

$$\begin{aligned} & \\ & -3.5t + 4.1t = (-3.5 + 4.1) t = 0.6t \\ & \end{aligned}$$

For s:

$$\begin{aligned} & \\ & -4s - 0.3s = (-4 - 0.3) s = -4.3s \\ & \end{aligned}$$

Constants:

$$\begin{aligned} & \\ & 4.5 - 7.1 = -2.6 \\ & \end{aligned}$$

5. Write the simplified sum

Putting these together:

$$\begin{aligned} & \\ & 0.6t - 4.3s - 2.6 \\ & \end{aligned}$$

This is the simplified form of the sum of the two expressions.

Understanding the Importance of Combining Like

Terms

Combining like terms is a crucial skill in algebra because it simplifies expressions, making them easier to evaluate, graph, or substitute values into. It helps in solving equations, analyzing functions, and performing algebraic manipulations efficiently.

Why Are Like Terms Important?

- They ensure clarity and simplicity in expressions.
- They allow for straightforward addition, subtraction, and further algebraic operations.
- They help in solving equations, as it reduces the complexity of the problem.

Additional Tips for Simplifying Algebraic Expressions

When dealing with algebraic expressions, keep these tips in mind:

- **Always identify like terms:** Variables with the same base and exponents are like terms.
- **Pay attention to signs:** Remember that adding a negative is equivalent to subtraction.
- **Line up similar terms:** Organize your expression to make combining terms easier.
- **Check your work:** After combining, verify that you have included all terms and kept track of signs.

Applying This Knowledge to Real-World Problems

Algebraic expressions are foundational in various fields such as physics, engineering, economics, and computer science. Simplifying expressions allows professionals to model real-world scenarios, optimize solutions, and interpret data effectively.

Example: If t represents time in hours and s represents speed in miles per hour, the simplified expression $(0.6t - 4.3s - 2.6)$ could be used to model a particular relationship or scenario, like estimating fuel consumption or travel time adjustments.

Practice Exercises to Master Combining Like Terms

To reinforce understanding, consider practicing with similar problems:

1. Find the sum of: $(2x + 3y - 4) + (-x + 5y + 6)$
2. Simplify: $(5a - 2b + 7) + (-3a + 4b - 2)$
3. Combine: $(7m + 2n - 3) + (-4m + 6n + 8)$

By working through these and similar exercises, you'll develop confidence and proficiency in algebraic manipulation.

Conclusion

The process of finding the sum of the expressions $((-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t))$ exemplifies core algebra skills: identifying like terms, combining coefficients, and simplifying expressions for clarity. The final simplified form, $(0.6t - 4.3s - 2.6)$, is easier to interpret, evaluate, or substitute specific values into for further calculations.

Mastering these techniques enhances problem-solving skills and provides a solid foundation for more advanced mathematical topics. Whether you're solving equations, modeling real-world situations, or preparing for exams, understanding how to simplify algebraic expressions is an invaluable skill in mathematics and beyond.

Remember: Practice makes perfect. Keep working on similar problems, and you'll become more confident in handling algebraic expressions with ease.

Frequently Asked Questions

How do I combine like terms in the expression $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$?

To combine like terms, you add the coefficients of the same variables and constants separately. For t : $-3.5t + 4.1t = 0.6t$; for s : $-4s - 0.3s = -4.3s$; constants: $4.5 - 7.1 = -2.6$.

What is the simplified form of the expression $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$?

The simplified form is $0.6t - 4.3s - 2.6$.

How do I find the sum of the expressions $(-3.5t - 4s + 4.5)$ and $(-7.1 - 0.3s + 4.1t)$?

You add the coefficients of matching variables and constants separately: for t , s , and constants, then combine the results to get the total sum.

What is the numerical value of the sum of the two expressions if $t=1$ and $s=2$?

Substitute $t=1$ and $s=2$ into the simplified expression $0.6t - 4.3s - 2.6$: $0.6(1) - 4.3(2) - 2.6 = 0.6 - 8.6 - 2.6 = -10.6$.

Can I factor the combined expression $0.6t - 4.3s - 2.6$?

Since the coefficients are not all common factors, factoring out a common factor isn't straightforward. You can factor out 0.1: $0.1(6t - 43s - 26)$.

Additional Resources

What Is The Sum Of These Expressions: $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$

When faced with algebraic expressions involving multiple variables, such as $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$, understanding how to combine like terms is essential. This process allows us to simplify complex expressions into a more manageable form, revealing the underlying relationships between the variables and constants. Whether you're a student brushing up on algebra skills or someone analyzing mathematical models, knowing how to add algebraic expressions is a fundamental skill that underpins more advanced topics in mathematics, science, and engineering.

In this guide, we will take a detailed, step-by-step approach to combining these two expressions. We will explore the concepts involved, demonstrate the process with clarity, and break down each component to ensure you grasp the underlying principles. By the end, you'll be equipped with a clear understanding of how to handle similar algebraic additions confidently.

Understanding the Components of the Expression

Before diving into the addition, let's analyze each part of the expressions:

The First Expression: $(-3.5t - 4s + 4.5)$

- Variables:
- t (multiplied by -3.5)
- s (multiplied by -4)
- Constants:
- $+4.5$

The Second Expression: $(-7.1 - 0.3s + 4.1t)$

- Constants:

- -7.1

- Variables:

- s (multiplied by -0.3)

- t (multiplied by +4.1)

The Goal: Combining Like Terms

When adding algebraic expressions, the key is to combine like terms, which are terms that:

- Have the same variables,

- Are raised to the same powers (in this case, all variables are to the first power).

In our expressions, the like terms are:

- Terms involving t

- Terms involving s

- Constant terms (numbers without variables)

Step-by-Step Breakdown of the Addition Process

Step 1: Write the Expressions Side by Side

For clarity, let's write the expressions:

- Expression 1: $-3.5t - 4s + 4.5$

- Expression 2: $-7.1 - 0.3s + 4.1t$

Step 2: Arrange Terms by Type

Rearranged, the expressions look like:

- t terms: $-3.5t$ (from expression 1), $4.1t$ (from expression 2)

- s terms: $-4s$ (from expression 1), $-0.3s$ (from expression 2)

- Constants: 4.5 (from expression 1), -7.1 (from expression 2)

Step 3: Combine Like Terms

Now, add the coefficients of the like terms separately:

Combining t terms:

- $(-3.5t) + (4.1t) = (-3.5 + 4.1) t = 0.6t$

Combining s terms:

$$- (-4s) + (-0.3s) = (-4 - 0.3) s = -4.3s$$

Combining constants:

$$- 4.5 + (-7.1) = 4.5 - 7.1 = -2.6$$

Final Simplified Expression

Putting it all together, the sum of the two expressions becomes:

$$0.6t - 4.3s - 2.6$$

This is the simplified, combined form of the original algebraic expressions, with all like terms added.

Additional Insights: Why Is This Important?

Understanding how to combine algebraic expressions is fundamental in various fields:

- Mathematics Education: Building blocks for solving equations, inequalities, and modeling.
- Physics: Combining forces or other quantities expressed algebraically.
- Economics & Business: Simplifying cost or revenue models.
- Engineering: Analyzing systems with multiple variables.

Mastering this process enhances problem-solving skills and prepares you for tackling more complex algebraic manipulations.

Common Challenges and Tips

While combining like terms is straightforward, some common pitfalls include:

- Misidentifying like terms: Ensure variables are exactly the same (including variables' exponents).
- Incorrect addition/subtraction of coefficients: Double-check arithmetic.
- Neglecting signs: Be attentive to positive and negative signs.

Tips to Avoid Errors:

- Write each expression neatly and clearly.
- Separate variables and constants visually.
- Use parentheses if necessary to keep track of signs.
- Double-check calculations for each group of like terms.

Practice Problems

To reinforce understanding, try these practice exercises:

1. Simplify: $(2x + 3y - 4) + (5x - y + 6)$
2. Add: $(-1.2a + 4b - 3) + (3a - 2b + 7)$
3. Combine: $(7m - 2n + 5) + (-3m + 4n - 2)$

Conclusion

Adding algebraic expressions like $(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$ involves a systematic process of identifying like terms and combining their coefficients. By carefully grouping variables and constants and performing arithmetic operations on their coefficients, you arrive at a simplified expression that accurately captures the sum.

This fundamental skill not only simplifies complex algebraic problems but also lays the groundwork for understanding more advanced mathematical concepts. Whether you're working through homework, analyzing data, or developing models, mastering the art of combining like terms is an essential step toward mathematical fluency.

Remember, practice makes perfect—so keep working with similar problems, and you'll develop confidence and precision in handling algebraic expressions!

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