

15 More Than Three Times A Number Is Equal To 75. Write An Equation And Solve For The Variable

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Understanding basic algebraic concepts is essential for solving everyday problems, especially those involving unknown quantities. One common type of problem involves translating a word problem into an algebraic equation, then solving for the unknown variable. In this article, we will explore the problem statement: "15 more than three times a number is equal to 75," and guide you step-by-step through creating the corresponding equation and solving for the variable.

Introduction to Algebraic Word Problems

Algebraic word problems serve as practical applications of mathematics in real-life scenarios. They typically involve:

- Identifying the unknown quantity (the variable)
- Translating the words into a mathematical expression or equation
- Solving the equation to find the value of the variable
- Interpreting the solution in the context of the problem

Understanding how to effectively convert words into algebraic expressions is crucial for solving these problems efficiently.

Breaking Down the Problem Statement

The problem statement is:

"15 more than three times a number is equal to 75."

Let's analyze each part:

- "a number": This indicates the unknown quantity, which we will represent by a variable, typically x .
- "three times a number": This translates to $3x$.
- "15 more than three times a number": This indicates adding 15 to $3x$,

which becomes $(3x + 15)$.

- "is equal to 75": This sets the expression equal to 75, forming the equation.

Constructing the Algebraic Equation

Based on the analysis, the algebraic equation that represents the problem is:

$$\begin{aligned} &[\\ &3x + 15 = 75 \\ &] \end{aligned}$$

Where:

- (x) = the unknown number

This simple linear equation encapsulates the problem statement perfectly.

Solving the Equation Step-by-Step

Now that we have the equation, the next step is to solve for (x) . Let's proceed methodically:

Step 1: Isolate the term with the variable

Subtract 15 from both sides of the equation to isolate $(3x)$:

$$\begin{aligned} &[\\ &3x + 15 - 15 = 75 - 15 \\ &] \end{aligned}$$

Simplifies to:

$$\begin{aligned} &[\\ &3x = 60 \\ &] \end{aligned}$$

Step 2: Solve for (x)

Divide both sides of the equation by 3:

$$\begin{aligned} &[\\ &\frac{3x}{3} = \frac{60}{3} \end{aligned}$$

\]

Simplifies to:

\[
 $x = 20$
\]

Interpreting the Solution

The solution $(x = 20)$ indicates that the number we are seeking is 20.

To verify, substitute $(x = 20)$ back into the original problem:

- Three times the number: $(3 \times 20 = 60)$
- More than three times: $(60 + 15 = 75)$

Since the sum equals 75, the solution is correct.

Additional Context and Real-Life Applications

Understanding such algebraic problems has many real-world applications, including:

- Budgeting and financial planning
- Calculating distances or times in travel problems
- Determining quantities in recipes or construction

For example, if you are told that "15 more than triple an amount of money equals \$75," you can quickly determine the original amount using algebra.

Common Mistakes to Avoid

When solving similar problems, be cautious of the following pitfalls:

- Incorrect translation: Misinterpreting words into algebraic expressions. For instance, confusing "more than" as subtraction instead of addition.
- Arithmetic errors: Mistakes during addition, subtraction, multiplication, or division.
- Ignoring the context: Always check if the solution makes sense within the problem's context.
- Forgetting to verify: Always substitute back into the original equation to confirm your solution.

Practice Problems for Mastery

To strengthen your understanding, try solving these similar problems:

1. Problem: Five more than twice a number is 17. Write the equation and solve for the number.

Solution:

- Translate: "Five more than twice a number" = $(2x + 5)$
- Equation: $(2x + 5 = 17)$
- Subtract 5: $(2x = 12)$
- Divide by 2: $(x = 6)$

2. Problem: Eight less than three times a number is 13. Find the number.

Solution:

- Translate: "Eight less than three times" = $(3x - 8)$
- Equation: $(3x - 8 = 13)$
- Add 8: $(3x = 21)$
- Divide by 3: $(x = 7)$

3. Problem: The sum of a number and 12 is 30. What is the number?

Solution:

- Translate: $(x + 12 = 30)$
- Subtract 12: $(x = 18)$

Conclusion

In summary, translating word problems into algebraic equations is an essential skill in mathematics. The problem "15 more than three times a number is equal to 75" demonstrates how to form an equation and solve for the unknown variable systematically. The key steps involve understanding the language, constructing the correct algebraic expression, and then applying algebraic operations to find the solution.

Mastering these techniques enables you to approach a wide range of mathematical problems with confidence and precision. Remember, practice is vital—regularly solving similar problems will improve your proficiency and help you apply algebraic reasoning effectively in real-world situations.

Frequently Asked Questions

What is the algebraic equation for '15 more than three times a number is equal to 75'?

The equation is $3x + 15 = 75$.

How do you solve the equation $3x + 15 = 75$ for x ?

Subtract 15 from both sides to get $3x = 60$, then divide both sides by 3 to find $x = 20$.

What is the value of the number when 15 more than three times it equals 75?

The value of the number is 20.

Can you verify the solution $x = 20$ for the equation $3x + 15 = 75$?

Yes, substitute $x = 20$: $3(20) + 15 = 60 + 15 = 75$, which confirms the solution is correct.

What steps are involved in solving the equation $3x + 15 = 75$?

First, subtract 15 from both sides to isolate the term with x , then divide both sides by 3 to solve for x .

Additional Resources

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Mathematics often presents us with simple yet intriguing problems that challenge our understanding of algebra and problem-solving skills. One such problem reads: "15 more than three times a number is equal to 75." At first glance, it may seem straightforward, but translating this into an algebraic equation and solving for the unknown variable requires careful analysis and a clear understanding of mathematical operations. In this article, we will explore how to construct the equation from the problem statement, solve it step-by-step, and discuss the broader significance of such algebraic exercises in everyday life.

Understanding the Problem Statement

Before jumping into the mathematics, it's essential to comprehend what the problem is asking. The sentence "15 more than three times a number is equal to 75" contains key phrases that guide us in forming an equation:

- "15 more than" indicates addition of 15.
- "three times a number" suggests multiplication of the unknown number by 3.
- "is equal to 75" sets the total sum to 75.

This breakdown helps us translate verbal statements into a formal algebraic expression. Recognizing these clues is vital for accurate equation formation, especially in more complex problems.

Translating the Word Problem into an Equation

Let's define the unknown number as a variable, typically x . Based on the problem, the phrase "three times a number" translates to $3x$. Adding 15 to this expression gives $3x + 15$. The phrase "is equal to 75" indicates an equation:

$$\backslash [3x + 15 = 75 \backslash]$$

This simple algebraic equation now encapsulates the problem's core information and sets the stage for solving for x .

Step-by-Step Solution of the Equation

Now that we have the equation:

$$\backslash [3x + 15 = 75 \backslash]$$

the goal is to find the value of x . Here are the steps:

Step 1: Subtract 15 from both sides

To isolate the term containing x , subtract 15 from both sides of the equation:

$$\backslash [3x + 15 - 15 = 75 - 15 \backslash]$$

which simplifies to:

$$\backslash [3x = 60 \backslash]$$

Step 2: Divide both sides by 3

Next, divide both sides by 3 to solve for x:

$$\left[\frac{3x}{3} = \frac{60}{3} \right]$$

simplifying to:

$$\left[x = 20 \right]$$

Result: The value of the unknown number x is 20.

Verifying the Solution

It's a good practice to verify your solution by substituting $x = 20$ back into the original problem statement:

- Three times 20 is $3 \times 20 = 60$.
- Adding 15 yields $60 + 15 = 75$.

Since this matches the given total, 75, our solution is correct.

Broader Context: The Significance of Formulating and Solving Equations

While this particular problem is straightforward, the process of translating words into equations and solving them is fundamental in mathematics. Such skills are essential not just academically but also in real-world applications like finance, engineering, and data analysis.

Practical Applications of Similar Equations

- Budgeting and Finance: Calculating total costs that include fixed fees plus variable expenses.
- Engineering: Determining dimensions or parameters based on specified constraints.
- Science: Formulating relationships between variables in experiments.

Understanding how to construct and solve equations allows individuals to model real-life scenarios mathematically, leading to better decision-making and problem-solving capabilities.

Common Mistakes to Avoid

When tackling similar problems, students and learners should be aware of common pitfalls:

- Misinterpreting phrases: For example, confusing "more than" with "less

than” or misreading multiplication and addition cues.

- Incorrect equation formation: Forgetting to include all parts of the statement or mixing up operations.
- Arithmetic errors: Simple mistakes in calculation can lead to incorrect solutions.
- Skipping verification: Always substitute back into the original statement to confirm the solution’s validity.

Being mindful of these issues can enhance accuracy and confidence in algebraic problem-solving.

Extending the Concept: Variations of the Problem

Once comfortable with this problem, learners can explore variations such as:

- Changing the total (e.g., “more than three times a number equals 100”).
- Reversing the order of operations (e.g., “the sum of 15 and three times a number”).
- Introducing additional steps or constraints (e.g., solving for multiple variables).

These exercises deepen understanding and improve flexibility in approaching algebraic challenges.

Final Thoughts

The problem “15 more than three times a number is equal to 75” exemplifies the power and simplicity of algebra. By carefully translating the words into an equation, solving systematically, and verifying the result, one gains not just the answer but also a valuable skill that underpins much of mathematics and real-world problem-solving.

Mastering this process encourages logical thinking, precision, and confidence—qualities essential for success in academics and beyond. As with many mathematical problems, practice and attention to detail are key. So, whether you are a student, educator, or lifelong learner, embracing these foundational skills paves the way for tackling more complex challenges with clarity and assurance.

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