

Five Less Than 3 Times A Number Is 25. What Is The Number?

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Solving word problems involving algebra can sometimes seem challenging, but with a structured approach, they become manageable. One such problem is: "Five less than 3 times a number is 25. What is the number?" This question requires translating a verbal statement into a mathematical equation, then solving for the unknown. In this comprehensive guide, we will explore how to approach this problem step-by-step, understand the underlying concepts, and practice similar problems to strengthen your algebra skills.

Understanding the Problem

Before jumping into calculations, it's important to clearly understand what the problem is asking. The statement is:

"Five less than 3 times a number is 25."

Let's break this down:

- "3 times a number" indicates multiplication: $3 \times (\text{some number})$.
- "Five less than" indicates subtraction: subtract 5 from the previous quantity.
- The result equals 25.

So, the problem is asking: What number, when tripled and then decreased by 5, gives 25?

Translating Words into an Equation

Mathematical problems often require translating verbal phrases into algebraic expressions. Let's do this step-by-step:

Step 1: Assign a Variable

- Let x represent the unknown number.

Step 2: Express "3 times a number"

- This becomes $3x$.

Step 3: Express "Five less than 3 times a number"

- This is $3x - 5$.

Step 4: Set the expression equal to 25

- According to the problem, this value is 25, so:

$$3x - 5 = 25$$

Solving the Equation

Now that we have the equation, the next step is to solve for x :

Step 1: Add 5 to both sides

$$\begin{array}{l} \backslash \\ 3x - 5 + 5 = 25 + 5 \\ \backslash \end{array}$$

$$\begin{array}{l} \backslash \\ 3x = 30 \\ \backslash \end{array}$$

Step 2: Divide both sides by 3

$$\begin{array}{l} \backslash \\ x = \frac{30}{3} \\ \backslash \end{array}$$

$$\begin{array}{l} \backslash \\ x = 10 \\ \backslash \end{array}$$

Therefore, the number is 10.

Verifying the Solution

It's always good practice to verify your solution by substituting it back into the original problem:

- "Three times the number" is $3 \times 10 = 30$.
- "Five less than 30" is $30 - 5 = 25$.

Since this matches the given condition, $x = 10$ is the correct answer.

Additional Practice Problems

To solidify understanding, try solving similar problems:

1. What is the number if five less than twice the number is 13?
2. Find the number if three times a number, increased by 4, equals 22.
3. If six less than four times a number equals 38, what is the number?
4. Determine the number if the sum of three times the number and 7 is 28.
5. What number doubled minus 3 equals 11?

Step-by-Step Approach to Solving Algebraic Word Problems

For effective problem-solving, follow these key steps:

1. Read the problem carefully and identify the unknown

- Assign a variable (commonly x) to the unknown quantity.

2. Translate the words into a mathematical expression

- Break down the sentence into parts and convert each into an algebraic term.

3. Write the equation based on the problem statement

- Combine the expressions and set equal to the given value.

4. Solve the equation using algebraic operations

- Perform inverse operations step-by-step (addition/subtraction, multiplication/division).

5. Verify your solution

- Substitute the value back into the original statement to ensure correctness.

6. Practice with similar problems

- Reinforce understanding by solving varied problems.

Common Mistakes to Avoid

Understanding common pitfalls can help you avoid errors:

- **Misinterpreting the problem:** Ensure you understand what each phrase means and how to translate it into math.
- **Incorrectly setting up the equation:** Double-check your expressions before solving.
- **Arithmetic errors:** Be careful with calculations, especially division and multiplication.
- **Not verifying the solution:** Always substitute back into the original problem to confirm.

Real-World Applications of Such Problems

Word problems like "Five less than 3 times a number is 25" are common in everyday scenarios, such as:

- Budget calculations (e.g., costs, savings)
- Distance and speed problems
- Cooking recipes adjustments
- Business profit and loss analysis

Understanding how to set up and solve such equations helps in making informed decisions and solving practical problems efficiently.

Summary

- The problem "Five less than 3 times a number is 25" can be translated into the algebraic equation $3x - 5 = 25$.
- Solving this yields $x = 10$.
- Always verify your solution by substituting back into the original verbal statement.
- Practice similar problems to build confidence and proficiency in algebra.

Conclusion

Mastering word problems involving algebra is essential for developing critical thinking and problem-solving skills. By breaking down the problem into manageable parts, translating words into equations, and carefully solving step-by-step, you can confidently solve a wide range of mathematical problems. The key is practice and attention to detail. Remember, the number in this problem is 10, and with this approach, you can tackle even more complex algebraic challenges with ease.

If you wish to improve your algebra skills further, consider exploring additional resources such as online tutorials, algebra textbooks, and practice worksheets. The more problems you solve, the more natural the process will become. Happy solving!

Frequently Asked Questions

What is the value of the number if five less than three times the number equals 25?

The number is 10.

How do you set up the equation for 'Five less than three times a number is 25'?

You write $3x - 5 = 25$, where x is the number.

What steps are involved in solving for the number in this problem?

First, add 5 to both sides to get $3x = 30$, then divide both sides by 3 to find $x = 10$.

Can you verify the solution $x = 10$ in the original problem?

Yes, substituting $x = 10$ gives $3(10) - 5 = 30 - 5 = 25$, which matches the given condition.

What is the importance of setting up the correct equation in word problems like this?

Correctly setting up the equation ensures an accurate solution and helps understand the relationship between the quantities involved.

Additional Resources

Five Less Than 3 Times A Number Is 25: An In-Depth Investigation into Algebraic Problem Solving

Mathematics, often regarded as the language of logic and reasoning, frequently presents intriguing puzzles that challenge our understanding and problem-solving skills. Among these, algebraic word problems stand out for their ability to transform words into numbers, requiring both comprehension and manipulation of symbols. One such problem that has garnered attention in educational circles and problem-solving communities is:

"Five less than 3 times a number is 25. What is the number?"

While at first glance, this problem appears straightforward, delving deeper reveals fundamental principles of algebra, problem interpretation, and solution strategies. This article aims to explore this problem comprehensively, dissecting its components, elucidating solution methods, examining common pitfalls, and discussing its pedagogical significance.

Understanding the Problem Statement

Before attempting to solve, it is essential to unpack the question carefully.

The problem states:

"Five less than 3 times a number is 25."

Key elements to analyze include:

- "Five less than": This phrase indicates subtraction.
- "3 times a number": This suggests multiplication.
- "is 25": The entire expression equals 25.

Rephrasing the problem in plain language:

Find a number such that when you multiply it by 3, then subtract 5, the result is 25.

Translating Words into Mathematical Expressions

The process of translating word problems into equations is fundamental in algebra. Let's define:

- Let x represent the unknown number.

Based on the problem:

- "3 times a number" translates to $3x$.
- "Five less than 3 times a number" translates to $3x - 5$.

The phrase "is 25" indicates equality:

$$3x - 5 = 25$$

This algebraic equation encapsulates the entire problem.

Step-by-Step Solution Strategy

Solving algebraic equations involves a systematic approach:

Step 1: Write the Equation

As derived:

$$3x - 5 = 25$$

Step 2: Isolate the Variable Term

Add 5 to both sides to undo subtraction:

$$3x - 5 + 5 = 25 + 5$$

$$3x = 30$$

Step 3: Solve for x

Divide both sides by 3:

$$x = 30 / 3$$

$$x = 10$$

Result: The unknown number is 10.

Verification of the Solution

Verifying the solution is crucial to ensure correctness:

- Compute 3 times the number: $3 \times 10 = 30$.
- Subtract 5: $30 - 5 = 25$.
- The result matches the given value, confirming the solution's accuracy.

Common Misinterpretations and Pitfalls

While the solution appears straightforward, students and problem-solvers often encounter misconceptions:

Misreading the Phrase "Less Than"

Some may mistakenly interpret "five less than" as $5 - 3x$ instead of $3x - 5$. The correct interpretation depends on understanding that "five less than a number" means subtracting 5 from the number, not the other way around.

Reversing the Order of Operations

Incorrectly manipulating the equation, such as dividing before adding, can lead to errors.

Overcomplicating the Problem

Attempting to introduce unnecessary steps or overthink the problem can hinder the straightforward solution process.

Educational Significance and Broader Implications

This problem exemplifies fundamental algebraic skills and demonstrates how language influences mathematical interpretation. It serves as an excellent teaching tool for:

- Developing reading comprehension in mathematical context.
- Reinforcing the importance of precise language interpretation.
- Practicing equation translation and solution strategies.

Moreover, such problems form the foundation for understanding more complex algebraic concepts, including inequalities, systems of equations, and functions.

Alternative Approaches and Extensions

While the straightforward algebraic method suffices, alternative approaches can deepen understanding:

Graphical Method

Plotting the function $f(x) = 3x - 5$ and identifying where it intersects the line $y=25$ visually confirms the solution at $x=10$.

Using Logical Reasoning

Recognizing that $3x - 5 = 25$ implies $3x = 30$, and considering the divisibility by 3, supports the solution.

Extensions for Practice

- What if the problem asked: "Five more than 3 times a number is 25"?
- How would the solution change if the problem involved a different constant or coefficient?
- Create similar problems with varying phrases to reinforce translation skills.

Summary and Final Thoughts

The problem "Five less than 3 times a number is 25" elegantly encapsulates core algebraic principles—translation of words into equations, systematic solution, and verification. Its simplicity makes it accessible for learners yet rich enough to serve as a foundational example in algebra education.

By carefully interpreting language, applying basic operations, and verifying results, problem-solvers develop critical thinking skills essential beyond mathematics. Whether as an introductory exercise or a stepping stone toward more complex problems, mastering this type of problem fosters confidence and competence in algebraic reasoning.

Answer: The number is 10.

In conclusion, this investigation highlights that even seemingly simple word problems require attention to detail, clarity in translation, and methodical problem-solving. Such exercises not only enhance mathematical skills but also cultivate logical reasoning, an invaluable competency in academics and everyday life.

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