

Twice A Certain Number Plus 4 Is At The Same Number Plus 10 Find The Number

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Understanding basic algebraic concepts is essential for solving many everyday problems, especially those involving unknowns or variables. One common type of algebraic problem involves setting up an equation based on a word problem and then solving for the unknown number. In this article, we will explore a specific problem: "Twice a certain number plus 4 is at the same number plus 10. Find the number." Through detailed explanations, step-by-step solutions, and practical tips, you'll learn how to approach similar problems with confidence.

Understanding the Problem Statement

Before diving into solving the problem, let's analyze what it is asking us to do.

The problem states:

- "Twice a certain number plus 4"
- "is at the same number plus 10"
- And asks: "Find the number."

In more straightforward terms, the problem is setting up an equality between two expressions involving an unknown number, which we'll denote as x .

Key Points:

- The unknown number is represented by x .
- One expression involves doubling the number and adding 4.
- The other expression involves the number itself plus 10.
- The problem suggests these two expressions are equal.

This sets the stage for forming an algebraic equation.

Formulating the Algebraic Equation

To solve for the unknown number, we first need to translate the word problem into a mathematical equation.

Step 1: Assign a Variable

Let:

- x = the unknown number.

Step 2: Write Expressions Based on the Problem

- "Twice a certain number plus 4" translates to $2x + 4$.
- "The same number plus 10" translates to $x + 10$.

Step 3: Set Up the Equation

Since the problem states these two expressions are equal:

$$2x + 4 = x + 10$$

This is the fundamental algebraic equation we need to solve.

Solving the Equation Step-by-Step

Now, let's go through the process of solving $2x + 4 = x + 10$ systematically.

Step 1: Isolate the Variable Terms

Subtract x from both sides to gather the x terms on one side:

$$2x + 4 - x = x + 10 - x$$

Simplifies to:

$$x + 4 = 10$$

Step 2: Isolate the Variable

Subtract 4 from both sides to solve for x :

$$x + 4 - 4 = 10 - 4$$

Simplifies to:

$$x = 6$$

Step 3: Verify the Solution

Substitute $x = 6$ back into the original expressions to confirm:

- Twice the number plus 4: $2(6) + 4 = 12 + 4 = 16$
- The number plus 10: $6 + 10 = 16$

Both expressions equal 16, confirming our solution is correct.

Understanding the Solution

The value $x = 6$ satisfies the conditions of the problem. The key steps involved:

1. Translating words into algebraic expressions.
2. Setting up an equation based on the equality described.
3. Applying algebraic operations to isolate x .
4. Verifying the solution to ensure correctness.

This approach can be generalized to similar problems involving unknowns and relationships between expressions.

Practical Applications of This Type of Problem

Problems like "Twice a certain number plus 4 is at the same number plus 10" are not just academic exercises; they have real-world applications. Here are some areas where understanding and solving such problems can be useful:

- **Budgeting and Finance:** Calculating unknown expenses or savings based on known relationships.
- **Business and Economics:** Setting up equations to find break-even points or profit margins.
- **Science and Engineering:** Formulating equations to determine unknown quantities like speed, distance, or time.
- **Daily Decision Making:** Comparing different scenarios to find optimal choices.

Additional Tips for Solving Similar Algebraic Problems

To improve your proficiency in solving algebraic equations derived from word problems, consider the following strategies:

1. Carefully Read the Problem

- Identify what is being asked.
- Determine what each part of the problem represents.
- Assign variables appropriately.

2. Translate Words into Mathematical Expressions

- Break down sentences into parts.

- Use consistent notation.
- Pay attention to keywords like "sum," "difference," "product," "quotient," "more than," "less than," "equal to," etc.

3. Set Up the Equation Correctly

- Make sure the expressions on both sides accurately reflect the problem's conditions.
- Double-check for any overlooked details.

4. Solve Step-by-Step

- Use algebraic operations systematically.
- Simplify expressions where possible.
- Keep track of each step to avoid errors.

5. Verify Your Solution

- Substitute the found value back into the original expressions.
- Ensure both sides of the equation are equal.
- Confirm that the solution makes sense within the context.

Common Mistakes to Avoid

While solving algebraic problems, be mindful of these common errors:

- Misreading the problem or misinterpreting the English statements.
- Incorrectly translating words into algebraic expressions.
- Forgetting to perform the same operation on both sides of the equation.
- Making arithmetic errors during simplification.
- Not verifying the solution within the context of the problem.

Practice Problems for Mastery

To reinforce your understanding, try solving these similar problems:

1. Five more than twice a number equals twenty. Find the number.
2. The sum of a number and 7 is equal to three times the number minus 5. Find the number.

3. Three times a number minus 4 is the same as twice the number plus 6. Find the number.
4. Twice a number decreased by 3 equals the number increased by 4. Find the number.

Working through these problems will help solidify your skills in translating word problems into algebraic equations and solving them efficiently.

Conclusion

In summary, solving the problem "Twice a certain number plus 4 is at the same number plus 10" involves understanding the problem, translating it into an algebraic equation, solving for the unknown, and verifying the solution. The key steps include assigning variables, setting up the equation, performing algebraic operations, and checking your work. Mastering these skills not only helps in academic settings but also enhances problem-solving abilities applicable in everyday life. With practice, you'll become more comfortable tackling a wide range of algebraic problems and applying them to real-world scenarios.

Frequently Asked Questions

What is the main algebraic equation in the problem 'Twice a certain number plus 4 is at the same number plus 10'?

The main equation is $2x + 4 = x + 10$.

How do you solve for the number in the equation $2x + 4 = x + 10$?

Subtract x from both sides to get $2x - x + 4 = 10$, simplifying to $x + 4 = 10$. Then subtract 4 from both sides to find $x = 6$.

What is the value of the number in the problem?

The number is 6.

Why do we subtract x from both sides in this problem?

Because we want to isolate the variable x on one side to solve for its value.

Can this problem be solved using mental math?

Yes, by recognizing the equation $2x + 4 = x + 10$, you can mentally subtract x and 4 from 10 to find x equals 6.

What are common mistakes to avoid when solving this type of algebra problem?

Common mistakes include forgetting to subtract x from both sides, mixing up terms, or making errors in basic arithmetic calculations.

How can understanding this problem help in real-world situations?

It helps develop problem-solving skills and understanding of linear equations, which are useful in various fields like finance, engineering, and everyday decision-making.

Is the solution unique for this problem?

Yes, since the equation is linear and only involves one variable, the solution is unique: $x = 6$.

What is the importance of checking your solution in algebra problems?

Checking your solution by substituting it back into the original equation ensures that your answer is correct.

How do you verify the solution $x = 6$ in the original problem?

Substitute $x = 6$ into the original equation: $2(6) + 4 = 6 + 10$, which simplifies to $12 + 4 = 16$ and $6 + 10 = 16$. Since both sides equal 16, the solution is verified.

Additional Resources

Twice A Certain Number Plus 4 Is At The Same Number Plus 10 Find The Number: A Comprehensive Exploration

Introduction

Mathematics often challenges us to think critically and apply logical reasoning to solve problems. One such problem involves algebraic expressions and the process of solving for an unknown number. The phrase "Twice a certain number plus 4 is at the same number plus 10" is a classic example of a linear algebra problem that requires translating words into mathematical equations, then solving for the unknown. This article provides an in-depth analysis of this problem, exploring the underlying concepts, step-by-step solution methods, variations, and real-world applications.

Understanding the Problem

At its core, the problem presents a statement that involves an unknown

number, often denoted as x . The key is to interpret the statement into an algebraic expression:

- "Twice a certain number" translates to $2x$.
- "Plus 4" adds 4 to that expression, resulting in $2x + 4$.
- "Is at the same number" indicates equality to the unknown number x .
- "Plus 10" adds 10 to the number, leading to $x + 10$.

Putting it all together, the problem states:

> Twice a certain number plus 4 is at the same number plus 10.

which translates into the equation:

$$\backslash[2x + 4 = x + 10 \backslash]$$

The goal is to find the value of x that satisfies this equation.

Step-by-Step Solution Approach

1. Translating the Word Problem into an Equation

The initial step involves carefully reading the problem and converting the words into an algebraic equation, as demonstrated above.

2. Setting Up the Equation

Based on the interpretation:

$$\backslash[2x + 4 = x + 10 \backslash]$$

This simple linear equation involves variables and constants, suitable for straightforward algebraic manipulation.

3. Isolating the Variable

To solve for x , follow these algebraic steps:

- Subtract x from both sides:

$$\backslash[2x + 4 - x = x + 10 - x \backslash]$$
$$\backslash[x + 4 = 10 \backslash]$$

- Subtract 4 from both sides:

$$\backslash[x + 4 - 4 = 10 - 4 \backslash]$$
$$\backslash[x = 6 \backslash]$$

Thus, the certain number is 6.

4. Verification

Always verify the solution by substituting $x = 6$ back into the original statement:

- Twice the number plus 4:

```
\[
2 \times 6 + 4 = 12 + 4 = 16
\]
```

- The number plus 10:

```
\[
6 + 10 = 16
\]
```

Since both sides are equal, $x = 6$ is the valid solution.

Deep Dive into Algebraic Concepts

1. Linear Equations

This problem is a classic example of a linear equation, which involves variables raised to the first power and constants. Linear equations are fundamental in algebra because they model many real-world situations involving constant rates and relationships.

2. Variable and Constants

- Variable: The unknown number, x , which we aim to find.
- Constants: The numbers 4 and 10, which are fixed values in the problem.

Understanding the roles of variables and constants is crucial for setting up equations correctly.

3. Equation Solving Techniques

- Combining Like Terms: Simplify both sides where possible.
- Isolating the Variable: Use inverse operations (addition/subtraction, multiplication/division).
- Checking Solutions: Substitute the found value into the original equation to verify correctness.

Variations of the Problem

While the original problem is straightforward, similar problems can vary in complexity:

1. Different Coefficients

- "Three times a number plus 5 equals the number minus 2."

Equation: $(3x + 5 = x - 2)$

Solution:

```
\[
3x + 5 = x - 2
\]
\[
3x - x = -2 - 5
\]
\[
2x = -7
\]
\[
x = -\frac{7}{2} = -3.5
\]
```

2. Multiple Variables

Problems involving more than one variable, such as:

- "Twice a number plus three times another number equals 10."

Equation:

```
\[
2x + 3y = 10
\]
```

Additional information would be needed to find specific values.

3. Word Problems with Context

Real-world problems can involve more context, such as:

- "A store sells pencils for \$2 each. If you buy x pencils, plus an additional \$4 fee, the total cost equals the cost of buying $x + 10$ pencils. Find x ."

Equation:

```
\[
2x + 4 = 2(x + 10)
\]
```

Solution:

```
\[
2x + 4 = 2x + 20
\]
```

Subtract $2x$ from both sides:

```
\[
4 = 20
\]
```

This indicates no solution or that the premise might be inconsistent, illustrating the importance of analyzing problem conditions thoroughly.

Applications of Such Algebraic Problems

Understanding how to translate word problems into equations is vital across numerous fields:

- Economics: Calculating costs, revenues, and profits.
- Physics: Relating distance, speed, and time.
- Engineering: Designing systems with specific constraints.
- Computer Science: Algorithm analysis involving variable relationships.
- Everyday Life: Budget planning, shopping, and planning activities.

Common Mistakes to Avoid

- Misinterpreting the language: Ensure each phrase is accurately translated into an algebraic expression.
- Incorrectly applying inverse operations: Be cautious when moving terms across the equation.
- Skipping verification: Always substitute the solution back into the original equation.
- Assuming multiple solutions: Linear equations typically have one solution unless they are identities or contradictions.

Practice Problems for Mastery

To solidify understanding, try solving these similar problems:

1. "Three times a number minus 5 equals 16. Find the number."
2. "Five added to twice a number equals 15. Find the number."
3. "The sum of a number and 7 is equal to twice the number minus 3. Find the number."
4. "Twice a number plus 4 is equal to 3 times the number minus 2. Find the number."

Summary and Final Thoughts

The problem "Twice a certain number plus 4 is at the same number plus 10" is a fundamental example of linear algebra that encapsulates essential problem-solving skills in mathematics. By breaking down the words into a clear algebraic equation, applying systematic solving techniques, and verifying the result, students and enthusiasts can develop confidence in tackling similar problems.

Mastery of such problems not only enhances mathematical literacy but also builds critical thinking and analytical skills applicable across many disciplines. Whether you're a student, educator, or lifelong learner, understanding the nuances of translating word problems into equations is a valuable skill that forms the foundation for more advanced mathematical concepts.

Additional Resources

- Online Algebra Tutorials: Websites like Khan Academy or Purplemath offer interactive lessons on solving linear equations.
- Math Practice Apps: Use apps such as Photomath or Brilliant to practice and verify solutions.
- Textbooks: Algebra textbooks often provide a variety of word problems with solutions for practice.

Conclusion

In this comprehensive exploration, we've dissected the problem "Twice a certain number plus 4 is at the same number plus 10 find the number" from understanding the basic statement to applying algebraic techniques for solution. Recognizing the importance of translating words into equations, solving step-by-step, and verifying answers are essential skills that transcend this particular problem, forming the backbone of mathematical problem-solving.

By mastering such problems, learners develop a systematic approach to tackling more complex algebraic challenges and gain confidence in applying mathematics to real-world situations. Remember, every problem is an opportunity to learn and sharpen your analytical thinking.

Happy solving, and keep exploring the fascinating world of mathematics!

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