

The Sum Of A Number And 9 Is Seven Less Than The Product Of The Number And 4. What Is The Number?

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Mathematics often involves solving equations to find unknown numbers, and word problems add an extra layer of challenge and real-world application. One common type of problem is translating a verbal statement into an algebraic equation, then solving for the unknown. In this article, we will explore the problem: "The sum of a number and 9 is seven less than the product of the number and 4. What is the number?" We will analyze the problem step by step, learn how to set up the equation, solve it systematically, and discuss the concepts involved in similar algebraic problems.

Understanding the Problem

Before diving into solving, it's crucial to understand what the problem is asking. The statement:

"The sum of a number and 9 is seven less than the product of the number and 4."

can be broken down into parts:

- The sum of a number and 9:

This part indicates we are adding 9 to some unknown number, which we will denote as x .

- Seven less than the product of the number and 4:

The product of the number and 4 is $4x$.

Seven less than this product is $4x - 7$.

The problem states that these two quantities are equal, so we can formulate an equation:

Sum of number and 9 = Seven less than the product of the number and 4

which translates into:

$$x + 9 = 4x - 7$$

Translating the Word Problem into an Equation

The key steps in translating a verbal problem into a mathematical equation involve:

1. Assigning a variable to the unknown (commonly x).
2. Expressing each part of the statement algebraically.
3. Combining these expressions according to the relationships described.

Step-by-step:

- Identify the unknown:

Let x be the unknown number.

- Express the sum:

$$x + 9$$

- Express the other quantity:

$$4x - 7$$

- Set up the equation:

$$x + 9 = 4x - 7$$

This algebraic equation now encapsulates the entire problem.

Solving the Equation

Once the equation is set, the next step is to solve for x. The process involves:

- Simplifying both sides if needed.
- Isolating the variable on one side.
- Performing inverse operations to find the value of x.

Step 1: Write down the equation

$$x + 9 = 4x - 7$$

Step 2: Bring all terms involving x to one side

Subtract x from both sides:

$$x + 9 - x = 4x - 7 - x$$

which simplifies to:

$$9 = 3x - 7$$

Step 3: Isolate the term with x

Add 7 to both sides:

$$9 + 7 = 3x - 7 + 7$$

which simplifies to:

$$16 = 3x$$

Step 4: Solve for x

Divide both sides by 3:

$$x = 16 / 3$$

So, the solution is:

$$x = \left(\frac{16}{3}\right)$$

or approximately 5.33.

Interpreting the Solution

The value of x is $\left(\frac{16}{3}\right)$. Since the problem involves a real number, fractional solutions are acceptable unless the context specifies integers only.

Verification:

- Sum of the number and 9:

$$\left(\frac{16}{3}\right) + 9 = \frac{16}{3} + \frac{27}{3} =$$

$$\frac{43}{3})$$

- Seven less than the product of the number and 4:

$$(4 \times \frac{16}{3} - 7 = \frac{64}{3} - 7 = \frac{64}{3} - \frac{21}{3} = \frac{43}{3})$$

Since both expressions equal $(\frac{43}{3})$, the solution is verified.

Additional Concepts and Related Problems

Understanding this problem helps build foundational skills in solving linear equations derived from word problems. Here are some related concepts:

- **Translating Word Problems:**

Practice converting verbal statements into algebraic expressions.

- **Solving Linear Equations:**

Mastering techniques like combining like terms, moving variables, and balancing equations.

- **Application in Real Life:**

Problems involving budgets, distances, time, and more often require translating words into equations.

Common Mistakes to Avoid

When solving similar problems, watch out for:

- Misinterpreting the sentence:**

Ensure each part of the statement is correctly translated.

- Incorrect operations:**

Be careful with signs, especially when subtracting or adding terms.

- Neglecting verification:**

Always substitute your solution back into the original statement to verify correctness.

- Ignoring the domain:**

Some problems may specify integers only, or positive numbers, affecting the solution set.

Summary of Steps to Solve Similar Problems

To systematically approach problems like "The sum of a number and 9 is seven less than the product of the number and 4," follow these steps:

- 1. Identify the unknown: Assign a variable, e.g., x .**

- 2. Translate verbal statements into algebraic expressions:**

Express all parts algebraically.

- 3. Set up the equation: Equate the two expressions as per the relationship described.**
- 4. Solve the equation: Use algebraic techniques to find the value of the unknown.**
- 5. Verify your solution: Substitute back into the original statement to confirm correctness.**

Conclusion

The problem "The sum of a number and 9 is seven less than the product of the number and 4" illustrates the essential process of translating word problems into algebraic equations and solving for unknowns. By assigning a variable, interpreting the verbal statement carefully, and applying algebraic techniques, we find that the number is $\frac{16}{3}$. Such problems not only enhance algebra skills but also improve problem-solving abilities applicable in various real-life scenarios.

Understanding the underlying concepts and practicing similar problems will develop confidence and proficiency in algebra, enabling you to tackle a wide range of mathematical

challenges with ease.

Frequently Asked Questions

What is the main problem described in the statement?

The problem states that the sum of a number and 9 is seven less than the product of the number and 4, and asks to find the number.

How can we set up an algebraic equation from this problem?

Let the number be x . The sum of the number and 9 is $x + 9$. The product of the number and 4 is $4x$. The statement says $x + 9$ is seven less than $4x$, so the equation is $x + 9 = 4x - 7$.

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

First, set up the equation: $x + 9 = 4x - 7$. Then, gather like terms by subtracting x from both sides and adding 7 to both sides. Simplify to solve for x .

What is the solution to the equation $x + 9 = 4x - 7$?

Subtract x from both sides: $9 = 3x - 7$. Add 7 to both sides: $16 = 3x$. Divide both sides by 3: $x = 16/3$.

Is the number $16/3$ a whole number or a fraction?

It's a fraction, specifically approximately 5.33, since 16 divided by 3 is not a whole number.

What does the solution tell us about the original problem?

The number that satisfies the condition is $16/3$, meaning the sum of this number and 9 is seven less than four times this number.

Can this problem be solved using mental math or requires algebra?

It requires algebra to set up and solve the equation, but once the equation is established, the solution can be found systematically.

How can we verify the solution $x = 16/3$ satisfies the original statement?

Substitute $x = 16/3$ into the original statement: sum is $x + 9 = 16/3 + 9$, and product is $4x = 4 \cdot 16/3 = 64/3$. Check if $x + 9$ equals $4x$ minus 7: $16/3 + 9$ should be equal to $64/3 - 7$. Both sides simplify to confirm the equality.

Additional Resources

Mathematical Problem-Solving

Introduction: Unlocking the Mystery of Algebra

Mathematics is often described as the language of the universe, providing us with tools to decode patterns, solve problems, and understand relationships in our world. Among its fundamental branches, algebra stands out as a powerful framework for translating real-world scenarios into mathematical expressions and equations. Whether you're a student tackling homework, an educator designing engaging lessons, or a curious mind exploring the elegance of numbers, mastering algebraic problem-solving is an invaluable skill.

In this article, we delve into a classic algebraic problem: "The sum of a number and 9 is seven less than the product of the number and 4." This problem, seemingly simple at first glance, offers a rich opportunity to understand how to translate words into equations, manipulate variables, and arrive at a solution with confidence. We will explore the problem step-by-step, providing clear explanations, strategic approaches, and practical insights to enhance your mathematical intuition.

The Core Question: What Is the Number?

At the heart of the problem lies a question that challenges us to find an unknown value—represented as a variable—based on

a given relationship. Framed more precisely:

"What is the number (unknown variable) such that when you add 9 to it, the result is seven less than the product of the number and 4?"

This sentence encapsulates several key ideas:

- An unknown number, which we will denote as (x) .**
- An operation involving addition: "the sum of a number and 9."**
- A comparison to another expression: "seven less than the product of the number and 4."**

Understanding these components is crucial for constructing the corresponding algebraic equation.

Breaking Down the Problem: Analyzing Each Part

To accurately translate the problem into a mathematical form, let's carefully analyze each segment:

1. The Sum of a Number and 9

- "The sum" indicates addition.**
- "A number" refers to our unknown variable, (x) .**
- "And 9" signifies that 9 is added to this number.**

Mathematically:

$$\boxed{x + 9}$$

2. The Product of the Number and 4

- "Product" indicates multiplication.
- "The number" is again (x) .
- "And 4" indicates multiplication by 4.

Mathematically:

$$[4x]$$

3. Seven Less Than the Product

- "Seven less than" indicates subtracting 7.
- "The product of the number and 4" is $(4x)$.

Mathematically:

$$[4x - 7]$$

4. The Relationship Between the Two Expressions

The original statement says:

"The sum of a number and 9 is seven less than the product of the number and 4."

This translates to:

$$[x + 9 = 4x - 7]$$

Constructing the Equation

Bringing together our analysis, the entire problem reduces to solving the following algebraic equation:

$$\backslash [x + 9 = 4x - 7 \backslash]$$

This equation encapsulates the relationship described in the problem, setting the stage for solving for $\backslash(x \backslash)$.

Step-by-Step Solution Strategy

Solving this type of equation involves a systematic approach:

- 1. Isolate the variable terms on one side of the equation.**
- 2. Simplify both sides if necessary.**
- 3. Solve for the variable $\backslash(x \backslash)$.**

Let's proceed through each step meticulously.

Step 1: Bring all $\backslash(x \backslash)$ -terms to one side

Subtract $\backslash(x \backslash)$ from both sides:

$$\backslash [x + 9 - x = 4x - 7 - x \backslash]$$

Which simplifies to:

$$\backslash [9 = 3x - 7 \backslash]$$

Step 2: Isolate the variable term

Add 7 to both sides to move constants to the left:

$$\begin{aligned} & \backslash \\ & 9 + 7 = 3x - 7 + 7 \\ & \backslash \end{aligned}$$

Simplifies to:

$$\begin{aligned} & \backslash \\ & 16 = 3x \\ & \backslash \end{aligned}$$

Step 3: Solve for x

Divide both sides by 3:

$$\begin{aligned} & \backslash \\ & x = \frac{16}{3} \\ & \backslash \end{aligned}$$

Final Answer:

$$\begin{aligned} & \backslash \\ & x = \frac{16}{3} \approx 5.333\ldots \\ & \backslash \end{aligned}$$

Thus, the number that satisfies the original problem is $\frac{16}{3}$, or approximately 5.33 when expressed as a decimal.

Verifying the Solution: Is the Answer Correct?

Verification is a vital step in problem-solving, ensuring that our solution aligns with the original statement.

Original problem restated:

> The sum of a number and 9 is seven less than the product of the number and 4.

Substitute $(x = \frac{16}{3})$:

- Sum of the number and 9:

$$\begin{aligned} & \left[\right. \\ x + 9 &= \frac{16}{3} + 9 = \frac{16}{3} + \frac{27}{3} = \\ & \frac{43}{3} \\ & \left. \right] \end{aligned}$$

- Seven less than the product of the number and 4:

$$\begin{aligned} & \left[\right. \\ 4x - 7 &= 4 \times \frac{16}{3} - 7 = \frac{64}{3} - 7 = \\ & \frac{64}{3} - \frac{21}{3} = \frac{43}{3} \\ & \left. \right] \end{aligned}$$

Since both expressions equal $(\frac{43}{3})$, the solution is confirmed as correct.

Broader Insights: Understanding Algebraic Relationships

The process we've undertaken offers several broader lessons:

1. Translating Words into Equations

- **Recognize key phrases:**
- **"Sum" corresponds to addition.**
- **"Product" indicates multiplication.**
- **"Less than" suggests subtraction.**
- **Carefully assign variables to unknown quantities.**
- **Convert complex sentences into clear algebraic expressions.**

2. Importance of Step-by-Step Simplification

- **Combining like terms and isolating variables reduces complexity.**
- **Verifying solutions by substitution ensures accuracy.**

3. Handling Fractions and Decimals

- **Solutions may involve fractional values, especially when coefficients are not whole numbers.**
- **Converting to decimals can aid intuition but always verify in original expressions.**

Practical Applications and Real-World Examples

Understanding such algebraic problems extends beyond academia into everyday life:

- **Budgeting: Calculating expenses and income based on relationships.**
- **Construction: Determining measurements that satisfy certain constraints.**

- **Science: Modeling relationships between variables, such as speed and distance.**

By mastering the art of translating words into equations and solving systematically, you develop the critical thinking skills necessary for various fields.

Summary: Key Takeaways

- **The problem "The sum of a number and 9 is seven less than the product of the number and 4" translates to:**

$$\begin{aligned} & \backslash \\ & x + 9 = 4x - 7 \\ & \backslash \end{aligned}$$

- **Solving the equation yields:**

$$\begin{aligned} & \backslash \\ & x = \frac{16}{3} \\ & \backslash \end{aligned}$$

- **Verification confirms the solution's correctness.**
- **The approach emphasizes careful reading, systematic translation, and verification, which are essential in algebra.**

Final Reflections: Embracing the Power of Algebra

Algebra serves as a bridge between intuitive reasoning and precise solutions. Problems like this sharpen your analytical skills, enabling you to approach complex scenarios with confidence. By dissecting word problems, forming correct equations, and solving step-by-step, you harness the power of mathematics to decode and understand the relationships that govern our world.

Whether tackling academic challenges, solving practical problems, or simply exploring the beauty of numbers, the skills developed through such exercises are invaluable. Keep practicing, stay curious, and let the language of algebra open new horizons in your mathematical journey.

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