I Thought Of A Number. 7 Times The Number Decreased By 13 Equals 5 Times The Number Increased By 5. What

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Mathematics often involves solving equations that challenge our problem-solving skills and logical thinking. One such intriguing problem is: "I thought of a number. 7 times the number decreased by 13 equals 5 times the number increased by 5. What is the number?" This type of question is a classic algebraic problem that helps develop critical thinking and foundational math skills. In this article, we will explore how to approach this problem step-by-step, understand the underlying concepts, and learn effective strategies to solve similar equations.

Understanding the Problem

Before jumping into solving the equation, it’s essential to comprehend what the problem is asking.

Breaking Down the Statement

- The problem begins with the phrase "I thought of a number," which indicates that we are dealing with an unknown variable, commonly represented as x.
- The phrase "7 times the number decreased by 13" translates mathematically to 7x - 13.
- The phrase "equals 5 times the number increased by 5" translates to 5x + 5.

Formulating the Equation

By translating the words into algebraic expressions, we establish the equation:

$$ 7x - 13 = 5x + 5 $$

This equation represents the core of the problem, and solving it will reveal the number that the question refers to.

Step-by-Step Solution Process

To find the unknown number, we need to solve the algebraic equation systematically.

1. Set Up the Equation

As established, the equation is:
$$ 7x - 13 = 5x + 5 $$

2. Isolate the Variable

Our goal is to get all the terms containing x on one side and constants on the other side.

- Subtract 5x from both sides:
$$ 7x - 5x - 13 = 5x - 5x + 5 $$
$$ 2x - 13 = 5 $$

- Add 13 to both sides:
$$ 2x - 13 + 13 = 5 + 13 $$
$$ 2x = 18 $$

- Divide both sides by 2:
$$ \frac{2x}{2} = \frac{18}{2} $$
$$ x = 9 $$

Solution: The number the person thought of is 9.

Verifying the Solution

Always verify your solution to ensure accuracy.

Substitute the value back into the original statement:

- "7 times the number decreased by 13" becomes:
$$ 7 \times 9 - 13 = 63 - 13 = 50 $$

- "5 times the number increased by 5" becomes:
$$ 5 \times 9 + 5 = 45 + 5 = 50 $$

Since both expressions evaluate to 50, the solution x = 9 is correct.

Understanding the Importance of Solving Such Problems

Solving algebraic equations like this one builds a foundation for more complex math topics. It enhances critical thinking, logical reasoning, and problem-solving skills, which are essential in various fields including science, engineering, economics, and everyday decision-making.

Applications of Solving Algebraic Equations

- Calculating budgets and expenses
- Determining unknown quantities in physics
- Analyzing data in statistics
- Developing algorithms in computer science

Common Mistakes to Avoid When Solving Algebraic Equations

While solving equations is straightforward, certain pitfalls can lead to errors.

1. Forgetting to Perform the Same Operation on Both Sides

Always perform the same mathematical operation on both sides of the equation to maintain equality.

2. Mixing Up Signs and Operations

Pay close attention to negative signs and ensure correct application of addition, subtraction, multiplication, and division.

3. Not Simplifying Properly

Simplify expressions regularly to keep the equation manageable and reduce errors.

Tips for Solving Similar Word Problems

- Translate words into algebraic expressions carefully.
- Write down each step clearly to avoid mistakes.
- Check your solution by substituting the found value back into the original problem.
- Practice similar problems to build confidence and proficiency.

Frequently Asked Questions (FAQs)

Q1: How do I set up an equation from a word problem?

A1: Read the problem carefully, identify the unknown quantity (usually represented as x), and translate each part of the sentence into mathematical expressions. Combine these expressions to form an equation.

Q2: What if the solution results in a fraction or negative number?

A2: That’s perfectly acceptable. The solution reflects the specific problem parameters. Always verify your answer to ensure it makes sense within the context.

Q3: Can I use a calculator to solve equations?

A3: Yes, calculators can assist in basic arithmetic, but understanding the algebraic steps is crucial for grasping the concepts and solving more complex problems.

Conclusion

The problem "I thought of a number. 7 times the number decreased by 13 equals 5 times the number increased by 5. What is the number?" demonstrates fundamental algebraic techniques. By translating words into equations, systematically solving for the unknown, and verifying your answer, you develop essential skills applicable across numerous mathematical and real-world scenarios. Remember, practice makes perfect—so keep challenging yourself with similar problems to enhance your problem-solving abilities and confidence in mathematics.

Keywords for SEO Optimization:

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Frequently Asked Questions

What is the main equation to solve for the number in the problem?

The main equation is 7x - 13 = 5x + 5.

How do you set up the equation based on the problem statement?

Translate the statement '7 times the number decreased by 13 equals 5 times the number increased by 5' into the equation 7x - 13 = 5x + 5.

What is the first step to solve the equation 7x - 13 = 5x + 5?

Subtract 5x from both sides to gather like terms: 7x - 5x - 13 = 5x - 5x + 5, which simplifies to 2x - 13 = 5.

How do you isolate the variable x in the equation 2x - 13 = 5?

Add 13 to both sides: 2x = 5 + 13, resulting in 2x = 18.

What is the next step after finding 2x = 18?

Divide both sides by 2 to solve for x: x = 18 / 2.

What is the value of the number x in the problem?

The value of x is 9.

How can you verify the solution x = 9?

Substitute x = 9 back into the original statements: 7(9) - 13 = 63 - 13 = 50, and 5(9) + 5 = 45 + 5 = 50, which are equal, confirming the solution is correct.

Additional Resources

I Thought Of A Number. 7 Times The Number Decreased By 13 Equals 5 Times The Number Increased By 5. What?

In the realm of algebraic reasoning and problem-solving, certain riddles stand out for their elegance, simplicity, and the way they challenge our understanding of basic mathematics. One such intriguing problem begins with a seemingly straightforward statement: "I thought of a number. 7 times the number decreased by 13 equals 5 times the number increased by 5." At first glance, it appears to be a simple algebraic exercise, but beneath its surface lies a rich tapestry of logical deduction, critical thinking, and educational insight. This article aims to dissect this problem thoroughly, exploring its

structure, solution strategies, potential misconceptions, and broader implications in mathematical education.

Understanding the Problem: Deciphering the Language

The problem as stated presents a classic scenario often used to introduce or reinforce algebraic concepts:

> "I thought of a number. 7 times the number decreased by 13 equals 5 times the number increased by 5. What?"

At its core, this problem involves translating a verbal statement into a mathematical equation. The key to solving such problems lies in carefully parsing the language to avoid misinterpretation.

Breaking down the statement:

1. "I thought of a number."
- Let’s denote this unknown number as x.

2. "7 times the number decreased by 13"
- Mathematically: 7x - 13

3. "Equals"
- Indicates an equality: =

4. "5 times the number increased by 5"
- Mathematically: 5x + 5

Putting it all together, the algebraic equation becomes:

7x - 13 = 5x + 5

Formulating the Mathematical Equation

The initial step in solving the problem involves transforming the verbal statement into a clear algebraic equation. This process is fundamental in algebra and critical for ensuring accurate problem-solving.

Step-by-step translation:

- Identify the unknown:
Let the number be x.

- Translate each part:

- "7 times the number decreased by 13" → 7x - 13
- "Equals" → =
- "5 times the number increased by 5" → 5x + 5

- Combine into an equation:

7x - 13 = 5x + 5

This algebraic expression is the foundation upon which we perform operations to find the value of x.

Solving the Equation: Step-by-Step Approach

Once the equation is established, the next step involves solving for x. This process is straightforward but requires careful attention to algebraic rules.

Step 1: Isolate the variable term

Subtract 5x from both sides to gather x terms on one side:

(7x - 5x) - 13 = 5x - 5x + 5

Simplifies to:

2x - 13 = 5

Step 2: Isolate the variable term further

Add 13 to both sides to move constants to the right:

2x - 13 + 13 = 5 + 13

Simplifies to:

2x = 18

Step 3: Solve for x

Divide both sides by 2:

x = 18 / 2

x = 9

Result: The number the problem refers to is 9.

Verifying the Solution

Verification is crucial in algebra to ensure the solution satisfies the original problem statement.

Plug x=9 back into the original verbal statement:

- "7 times the number decreased by 13":
7 9 - 13 = 63 - 13 = 50

- "5 times the number increased by 5":
5 9 + 5 = 45 + 5 = 50

Since both sides equal 50, the solution x=9 is correct.

Deeper Exploration: Variations and Educational Significance

While this particular problem is straightforward, it opens the door to numerous educational discussions and variations that can deepen understanding.

1. Variations in Verbal Phrasing

- Using different phrases such as "more than," "less than," or "the sum of" can change the structure of the equation.
- For example:
- "7 times the number decreased by 13" versus "13 less than 7 times the number."
These require careful interpretation to avoid miswriting the equation.

2. Introducing Non-Linear Elements

- Problems could incorporate quadratic or higher-degree terms to challenge students further.
- Example: "The number doubled plus its square equals 20."

3. Word Problems as Critical Thinking Tools

- Such problems serve as excellent tools to develop critical thinking, comprehension skills, and

algebraic fluency.
- They also demonstrate the importance of precise language in mathematical communication.

Common Misconceptions and Pitfalls

Despite their simplicity, problems like this can be fraught with misunderstandings, especially for beginners.

Misconception 1: Misinterpreting the phrase "decreased by"

- Some students might incorrectly interpret "7 times the number decreased by 13" as (7x) - 13 versus 7(x - 13).
- The correct interpretation, based on standard algebraic language, is 7x - 13.

Misconception 2: Confusing increase and decrease

- For "the number increased by 5," the correct expression is x + 5 or 5 + x.
- Students might forget to account for the order, especially in more complex expressions.

Misconception 3: Forgetting to verify the solution

- Always plugging the found value back into the original statement ensures accuracy.

Broader Implications in Mathematical Education

This problem exemplifies fundamental concepts in algebra, such as translating words into equations, solving for unknowns, and verifying solutions. Its study offers several educational insights:

- Language Precision: Emphasizes the importance of understanding and interpreting mathematical language accurately.
- Stepwise Problem Solving: Demonstrates a systematic approach—translate, simplify, solve, verify.
- Building Confidence: Starting with simple problems builds confidence before tackling more complex ones.
- Critical Thinking: Encourages students to consider multiple interpretations and verify their answers.

Conclusion: From Simple Phrases to Mathematical Clarity

The question "I Thought Of A Number. 7 Times The Number Decreased By 13 Equals 5 Times The Number Increased By 5. What?" serves as an excellent illustration of how everyday language can be

transformed into precise mathematical expressions. Its resolution—finding the number 9—not only satisfies the conditions of the problem but also highlights key algebraic principles.

More broadly, problems like this serve as foundational tools for developing mathematical literacy. They teach students to read carefully, translate accurately, and verify their solutions—all vital skills in both academic settings and real-world problem-solving. As educational tools, they remind us that even the simplest equations can open doors to deeper understanding and critical thinking.

In the end, this problem encapsulates the elegance of algebra: transforming words into numbers, and questions into solutions—a testament to the power of mathematical language and reasoning.

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