

If 5/6 Of A Certain Number Is -20/3, The Number Is

If 5/6 Of A Certain Number Is -20/3, The Number Is: A Complete Guide to Solving Unknowns in Algebra

Understanding how to find an unknown number when given a fraction of it is a fundamental skill in algebra. Whether you're a student preparing for exams or someone brushing up on basic math concepts, mastering these types of problems can significantly improve your problem-solving confidence. In this article, we will explore the problem: If 5/6 of a certain number is -20/3, what is the number? We will walk through the step-by-step process to find the answer, explain key concepts involved, and provide tips to approach similar problems in the future.

Introduction to the Problem

Suppose you are given the statement:

"If 5/6 of a certain number is -20/3, what is the number?"

This type of problem involves algebraic reasoning, where a variable represents the unknown number. The key is to translate the verbal statement into an algebraic equation and then solve for that variable.

Understanding the Components of the Problem

Before jumping into solving, it's helpful to understand the components involved:

- Fraction of a number: The phrase "5/6 of a number" is mathematically represented as $\frac{5}{6} \times x$, where x is the unknown number.
- Given value: The product of this fraction is $-\frac{20}{3}$.
- Goal: Find the value of x .

Step-by-Step Solution Process

Step 1: Set up the algebraic equation

Translate the verbal statement into an equation:

$$\frac{5}{6} \times x = -\frac{20}{3}$$

Step 2: Isolate the variable x

To find x , divide both sides of the equation by $\frac{5}{6}$:

$$x = \left(-\frac{20}{3}\right) \div \frac{5}{6}$$

Dividing by a fraction is equivalent to multiplying by its reciprocal:

$$x = -\frac{20}{3} \times \frac{6}{5}$$

Step 3: Simplify the expression

Multiply the numerators and denominators:

$$x = -\frac{20 \times 6}{3 \times 5}$$

Calculate numerator and denominator:

$$x = -\frac{120}{15}$$

Simplify:

$$x = -8$$

Answer: The number is -8 .

Detailed Explanation of the Solution

Understanding the steps involved in solving the problem helps reinforce the concepts:

- Multiplying by the reciprocal: When dividing by a fraction, always multiply by its reciprocal, which in this case is $\frac{6}{5}$. This step is essential for isolating the unknown x .
- Canceling common factors: Notice that numerator 120 and denominator 15 share common factors, which simplifies the fraction to -8 .
- Sign considerations: Since the product was negative, the answer is also negative.

Additional Tips for Solving Similar Problems

1. Always Translate Words into Algebraic Equations

- Phrases like "of" indicate multiplication.
- The phrase "is" indicates equality.
- Be cautious with signs and negative values.

2. Use Inverse Operations

- To isolate the variable, perform inverse operations: multiplication/division, addition/subtraction.
- When dividing by a fraction, multiply by its reciprocal.

3. Simplify Fractions Early

- Simplify fractions to make calculations easier.
- Cancel common factors before multiplying.

4. Check Your Work

- Substitute your solution back into the original expression to verify correctness.

Common Mistakes to Avoid

- Incorrectly handling division by fractions: Remember to multiply by the reciprocal.
- Ignoring signs: Pay attention to negative signs in the problem.
- Forgetting to simplify: Always reduce fractions to their simplest form for clarity and accuracy.
- Mixing up the order of operations: Follow the proper sequence when solving equations.

Practice Problems

To reinforce your understanding, try solving these similar problems:

1. If $\frac{3}{4}$ of a number is $\frac{9}{2}$, what is the number?
2. The sum of $\frac{2}{5}$ of a number and 4 equals 6. Find the number.
3. If $\frac{7}{8}$ of a number is $-\frac{14}{4}$, what is the number?

Advanced Applications and Real-World Examples

Understanding how to manipulate fractions and solve for unknowns isn't just an academic exercise; it has practical applications in various fields:

- Finance: Calculating unknown investments or interest rates.
- Science: Determining unknown quantities in experiments based on proportional relationships.
- Engineering: Solving problems involving ratios, proportions, and measurements.

Summary

In this article, we've thoroughly explored the problem: If $\frac{5}{6}$ of a certain number is $-\frac{20}{3}$, what is the number? We learned how to:

- Translate the problem into an algebraic equation.
- Use reciprocal multiplication to isolate the unknown.
- Simplify the resulting expression to find the answer.

The key takeaway is that understanding the relationship between fractions and unknown quantities is essential for solving a wide range of algebraic problems. Through careful application of inverse operations and attention to detail, you can confidently tackle similar questions and develop a stronger foundation in mathematics.

Final Thoughts

Mastering problems involving fractions and unknowns enhances your problem-solving skills and prepares you for more advanced mathematical concepts. Keep practicing with different types of problems, and remember to approach each step methodically. With consistent effort, you'll become proficient in solving algebraic equations involving fractions, leading to greater confidence and success in your mathematical journey.

Keywords: algebra, fractions, unknown number, solving equations, inverse operations, mathematical problem-solving, fractions in algebra, how to find an unknown, algebra practice problems

Frequently Asked Questions

If $\frac{5}{6}$ of a certain number is $-\frac{20}{3}$, what is the number?

The number is -8.

How do you find the original number if $\frac{5}{6}$ of it equals $-\frac{20}{3}$?

Multiply both sides by the reciprocal of $\frac{5}{6}$, which is $\frac{6}{5}$, so the number is $(-\frac{20}{3}) (\frac{6}{5}) = -8$.

What is the step-by-step solution to determine the number when $\frac{5}{6}$ of it equals $-\frac{20}{3}$?

Step 1: Write the equation: $(\frac{5}{6})x = -\frac{20}{3}$. Step 2: Multiply both sides by $\frac{6}{5}$ to isolate x : $x = (-\frac{20}{3})(\frac{6}{5})$. Step 3: Simplify: $x = (-20 \cdot 6) / (3 \cdot 5) = (-120) / 15 = -8$.

Can you verify the solution by plugging the number back into the original equation?

Yes. Substitute $x = -8$ into $(5/6)x$: $(5/6)(-8) = (5 \cdot -8) / 6 = -40/6 = -20/3$, confirming the solution.

Is the solution to the problem unique?

Yes, since the equation is linear and involves straightforward algebra, the solution $x = -8$ is unique.

Additional Resources

If 5/6 Of A Certain Number Is $-20/3$, The Number Is: An Investigative Analysis

In the realm of algebra and mathematical problem-solving, a recurring theme involves translating word problems into equations and then deciphering the unknowns. One classic problem that exemplifies this process is: "If $5/6$ of a certain number is $-20/3$, the number is?" This question, seemingly straightforward, invites a deeper exploration into algebraic reasoning, fraction manipulation, and the underlying principles that guide such problems. This article provides a comprehensive investigation into this problem, examining the steps to find the number, the rationale behind each step, and broader implications for mathematical understanding.

Understanding the Problem: Framing the Question

Before delving into calculations, it's essential to interpret the problem statement accurately. The question asks:

"If $5/6$ of a certain number is $-20/3$, what is the number?"

This involves two key components:

- The unknown number, which we'll denote as (x) .
- The relationship between this number and a fraction of it, expressed as an equation.

In essence, the problem states that:

$$\left(\frac{5}{6}\right) \times x = -\frac{20}{3}$$

The goal is to determine the value of (x) .

Translating the Verbal Statement into an Equation

The first step in solving such problems is to convert the verbal statement into a clear algebraic expression. Here, the phrase "5/6 of a certain number" indicates multiplication:

$$\frac{5}{6} \times x$$

The phrase "is" indicates equality:

$$\frac{5}{6} \times x = \frac{20}{3}$$

This forms a simple linear equation with one variable, which can be solved using algebraic operations.

Step-by-Step Solution Process

Let's methodically solve for x :

Step 1: Write down the equation

$$\frac{5}{6} x = \frac{20}{3}$$

Step 2: Isolate x by dividing both sides by $\frac{5}{6}$

Dividing by a fraction is equivalent to multiplying by its reciprocal:

$$x = \frac{20}{3} \times \frac{6}{5}$$

Step 3: Simplify the right side

Multiply numerators and denominators:

$$x = \left(\frac{20}{3} \times \frac{6}{5} \right)$$

$$x = \left(\frac{20 \times 6}{3 \times 5} \right)$$

Calculate numerator and denominator:

$$x = \left(\frac{120}{15} \right)$$

Simplify the fraction:

$$x = 8$$

Thus,

$$x = -8$$

Conclusion: The Number

The solution reveals that the number is -8 . To verify, substitute $x = -8$ back into the original relationship:

$$\frac{5}{6} \times (-8) = ?$$

Calculate:

$$\frac{5}{6} \times -8 = \frac{5 \times -8}{6} = \frac{-40}{6}$$

Simplify:

$$\frac{-40}{6} = -\frac{20}{3}$$

which matches the given value, confirming the correctness of the solution.

Deeper Insights: Fractions, Negatives, and Algebraic Principles

This problem demonstrates fundamental algebraic principles, particularly how to manipulate fractions and solve for an unknown.

Handling Fractions in Equations

- Multiplying both sides by the reciprocal of a fraction is essential.
- Simplification after multiplication ensures clarity and accuracy.

Dealing with Negative Values

- The negative sign indicates the number's value is less than zero.
- The algebraic operations preserve the sign throughout the calculation.

Understanding the Relationship between Parts and Whole

- The problem emphasizes the proportional relationship: a part ($\frac{5}{6}$) of a number equates to a specific value.
- This concept is foundational in fractions, ratios, and proportional reasoning.

Broader Mathematical Context and Applications

While this problem is straightforward, it resonates with many real-world scenarios involving proportions, such as:

- Financial calculations: Determining the total amount based on a percentage or fractional part.
- Physics: Calculating total quantities when a fraction of a quantity is known.
- Statistics: Inferring total populations from known fractions or samples.

Understanding how to manipulate fractions and solve for unknowns is vital across disciplines.

Common Pitfalls and Misconceptions

While the solution appears simple, learners often encounter errors such as:

- Incorrect reciprocal multiplication: Forgetting to invert the fraction when dividing.
- Sign errors: Mishandling negatives during multiplication or division.
- Fraction simplification mistakes: Overlooking opportunities to reduce fractions for clarity.

Being mindful of these ensures accurate problem-solving.

Practice Problems to Reinforce Learning

To solidify understanding, consider these similar problems:

1. If $\frac{3}{4}$ of a number is 15, find the number.
2. A certain number's one-third equals $\frac{5}{2}$. What is the number?
3. If $\frac{x}{2} = -7$, what is x ?

Solutions involve similar steps: translating to equations, isolating the variable, and simplifying.

Final Reflection: The Power of Algebra

This investigation underscores the elegance and utility of algebra in solving real-world and theoretical problems. The key takeaways include:

- Translating words into equations.
- Using reciprocal multiplication to isolate the unknown.
- Simplifying fractions for clarity.

The problem "If $\frac{5}{6}$ of a certain number is $-\frac{20}{3}$, the number is?" exemplifies how algebraic principles operate seamlessly across contexts, providing tools to decode and understand relationships involving fractions and negatives.

In summary, the number is -8 , and the process exemplifies basic yet powerful algebraic techniques fundamental to mathematics education and practical problem-solving.

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Author's Note: This article aims to clarify the steps involved in solving fraction-based algebra problems, emphasizing accuracy, conceptual understanding, and practical application.

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