

Two Numbers Have A Sum Of 21. One Number Is 7 More Than The Other. Find The Numbers. The Smaller Number

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Mathematics often presents us with intriguing problems that challenge our reasoning and problem-solving skills. One common type involves working with two numbers that satisfy specific conditions. In this article, we'll explore the problem: Two numbers have a sum of 21. One number is 7 more than the other. Find the numbers. The smaller number. We'll analyze the problem step-by-step, learn how to set up equations, solve them systematically, and understand the underlying concepts. This comprehensive guide aims to help learners of all levels grasp the methods used to solve similar algebraic word problems, enhancing both their problem-solving skills and mathematical understanding.

Understanding the Problem

Before diving into the solution, it's important to clearly understand what the problem is asking. Let's break down the key components:

Restating the problem:

- There are two numbers.
- Their sum (addition of both) is 21.
- One number is 7 more than the other.
- The goal is to find the two numbers, specifically identifying the smaller number.

Key points to consider:

- The relationship between the two numbers is linear (one is 7 more than the other).
- The sum of the two numbers is a fixed value (21).
- The problem emphasizes the smaller number, which guides us to define variables accordingly.

Setting Up Variables

The first step in solving algebraic word problems is to assign variables that represent the unknown

quantities.

Choosing variables:

- Let x be the smaller number.
- Since one number is 7 more than the other, the larger number can be expressed as $x + 7$.

This setup simplifies the problem because it uses a single variable to represent the smaller number, and the larger number is directly related to it.

Formulating Equations

Using the information given, we can formulate an algebraic equation:

Sum of the two numbers:

$$-(x + (x + 7) = 21)$$

This equation states that the smaller number plus the larger number equals 21.

Steps to create the equation:

- The smaller number is x .
- The larger number is $x + 7$.
- Sum: $x + (x + 7) = 21$.

Solving the Equation

Now, let's solve the algebraic equation step-by-step.

Step 1: Simplify the equation

$$\begin{aligned} & \\ x + x + 7 &= 21 \end{aligned}$$

$$\begin{aligned} & \\ & \end{aligned}$$

$$\begin{aligned} & \\ 2x + 7 &= 21 \end{aligned}$$

$$\begin{aligned} & \\ & \end{aligned}$$

Step 2: Isolate the variable

Subtract 7 from both sides:

$$\begin{aligned} & \backslash[\\ & 2x = 21 - 7 \\ & \backslash] \\ & \backslash[\\ & 2x = 14 \\ & \backslash] \end{aligned}$$

Step 3: Divide both sides by 2

$$\begin{aligned} & \backslash[\\ & x = \frac{14}{2} = 7 \\ & \backslash] \end{aligned}$$

Thus, the smaller number is 7.

Verifying the Solution

It's always good practice to verify the solution to ensure it satisfies all conditions.

Verification steps:

- The smaller number: 7.
- The larger number: $7 + 7 = 14$.
- Sum: $7 + 14 = 21$.

Since the sum matches the given condition and the larger number is 7 more than the smaller, the solution is correct.

Answer Summary

Based on the calculations, the smaller number is 7.

The two numbers are:

- 7 (smaller number)
- 14 (larger number)

Understanding the Concept Behind the Solution

Let's analyze the core concepts applied in this problem to deepen understanding.

Key concepts involved:

1. **Variables:** Assigning symbols to unknown quantities simplifies complex problems.
2. **Linear equations:** Formulating and solving equations based on word problem conditions.
3. **Verification:** Checking solutions against the original problem ensures accuracy.

Practical tips for similar problems:

- Always carefully read the problem to identify what is being asked.
- Define variables clearly and consistently.
- Translate the words into algebraic expressions accurately.
- Check your solution by plugging the values back into the original conditions.

Additional Practice Problems

To reinforce understanding, try solving these similar problems:

Problem 1:

Two numbers have a sum of 30. One number is 5 less than the other. Find the smaller number.

Problem 2:

The sum of two numbers is 50. One number is 12 more than the other. Find the larger number.

Problem 3:

The sum of two numbers is 100. One number is 20 less than the other. Find both numbers.

Attempt these problems using the same approach: assign variables, formulate equations, solve, and verify.

Conclusion

Solving algebraic problems involving sums and differences of numbers requires clear understanding, proper variable assignment, and systematic equation solving. In the specific problem of finding two numbers with a sum of 21 where one is 7 more than the other, we demonstrated how to set up and solve the problem efficiently.

Remember:

- Defining the smaller number as a variable simplifies the process.
- Formulating an equation based on the problem's conditions is crucial.
- Always verify your solution to ensure accuracy.

By mastering these techniques, you'll be better equipped to tackle similar problems confidently and efficiently. Keep practicing with different scenarios to strengthen your algebra skills and enhance your mathematical reasoning.

Meta Description:

Learn how to find two numbers with a sum of 21 where one is 7 more than the other. Step-by-step solution with detailed explanation, algebra tips, and practice problems.

Frequently Asked Questions

How do you set up an equation to find two numbers with a sum of 21 where one is 7 more than the other?

Let the smaller number be x . Then, the larger number is $x + 7$. The sum equation is $x + (x + 7) = 21$.

What is the value of the smaller number when two numbers sum to 21 and one is 7 more than the other?

The smaller number is 7.

How do you verify the solution for the two numbers in this problem?

Calculate the larger number as $7 + 7 = 14$; then sum $7 + 14 = 21$, confirming the solution is correct.

Can you explain step-by-step how to find the smaller number in this problem?

Yes. First, set the smaller number as x . Write the equation $x + (x + 7) = 21$. Simplify to $2x + 7 = 21$. Subtract 7 from both sides: $2x = 14$. Divide both sides by 2: $x = 7$. So, the smaller number is 7.

What are the two numbers in the problem, and which is smaller?

The two numbers are 7 and 14, with 7 being the smaller number.

How can this problem be generalized to find two numbers with a given sum and a specified difference?

Set the smaller number as x , then the larger as x plus the difference. Use the sum equation to solve for x , then find both numbers accordingly.

Additional Resources

Two Numbers Have A Sum Of 21. One Number Is 7 More Than The Other. Find The Numbers. The Smaller Number

When faced with word problems involving two numbers, it can sometimes seem daunting to translate the real-world scenario into a mathematical equation. In this particular problem, we're told that two numbers have a sum of 21 and one number is 7 more than the other. Our goal is to find the smaller number. This type of problem is a classic example of algebraic reasoning and can be approached systematically with the right steps. Let's walk through this problem step-by-step to understand how to derive the solution confidently.

Understanding the Problem

Before jumping into calculations, it's essential to comprehend the given information:

- Sum of two numbers: The total of both numbers adds up to 21.
- Relationship between the numbers: One of the numbers is 7 more than the other.
- What we need to find: The smaller number.

This problem involves two key pieces of data:

1. The total sum of the two unknown numbers.

2. The difference in their values, expressed as "7 more than."

Breaking Down the Problem

Step 1: Assign Variables

The first step in solving algebraic word problems is to assign variables to the unknown quantities:

- Let x represent the smaller number.
- Since one number is 7 more than the other, the larger number can be represented as $x + 7$.

This approach simplifies the problem into a manageable algebraic form.

Step 2: Set Up the Equation

Using the information about the sum:

- The sum of the two numbers equals 21.
- In terms of variables, this becomes:

$$x + (x + 7) = 21$$

This is the core equation that captures the relationships described in the problem.

Solving the Equation

Step 3: Simplify and Solve

Now, perform algebraic operations to find the value of x :

1. Expand the equation:

$$x + x + 7 = 21$$

2. Combine like terms:

$$2x + 7 = 21$$

3. Isolate x :

Subtract 7 from both sides:

$$2x = 21 - 7$$

$$2x = 14$$

4. Divide both sides by 2:

$$x = 14 / 2$$

$$x = 7$$

This calculation shows that the smaller number is 7.

Verifying the Solution

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

- Smaller number $x = 7$.
- Larger number $= x + 7 = 7 + 7 = 14$.
- Sum: $7 + 14 = 21$, which matches the given total.

Since the sum checks out, and the relationship "one number is 7 more than the other" holds true, our solution is correct.

Summary of the Solution

Step	Explanation	Result
1	Assign variables	Let smaller number = x $x = 7$
2	Set up equation	Sum of numbers: $x + (x + 7) = 21$ -
3	Simplify	$2x + 7 = 21$ -
4	Solve for x	$2x = 14$ $x = 7$
5	Find larger number	$x + 7 = 14$ -
6	Verify	Sum: $7 + 14 = 21$ Confirmed

Therefore, the smaller number is 7.

Additional Insights and Variations

While this problem has a straightforward solution, similar problems can vary in complexity. Here are some common variations and how to approach them:

1. Different Total Sum and Relationship

- If the sum or the difference changes, simply adjust the equation accordingly.
- For example, if the sum was 30 and one number is 5 more than the other, the equation becomes:

$$x + (x + 5) = 30$$

2. Unknown Difference

- Sometimes, the difference isn't specified explicitly. In such cases, you might be asked to find both

numbers given only the sum.

3. Multiple Solutions

- Certain problems could have multiple solutions if constraints aren't specified tightly. Always verify solutions by substituting back into original conditions.

Practical Applications of Such Word Problems

Understanding how to solve problems like "Two numbers have a sum of 21. One number is 7 more than the other" is not just an academic exercise. These skills are useful in real-life scenarios, such as:

- Budgeting and financial planning
- Distributing resources or tasks evenly
- Understanding relationships in data sets
- Solving puzzles and riddles

Tips for Solving Similar Word Problems

- Read the problem carefully to identify what is given and what needs to be found.
- Assign variables thoughtfully to represent unknown quantities.
- Translate words into algebraic expressions systematically.
- Check your work by substituting your solutions back into the original conditions.
- Practice with variations to strengthen problem-solving skills.

Final Thoughts

By methodically translating the problem into an algebraic equation, solving, and verifying, you can confidently find the smaller number in problems involving sums and relationships between numbers. This approach promotes critical thinking and mathematical literacy, essential skills in both academic and everyday contexts.

Remember, every problem has a solution — you just need to know how to set up the right equation. Keep practicing, and you'll find that these types of problems become much more manageable over time!

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