

The Sum Of Two Numbers Is 43. One Number Is Five Less Than Three Times The Other Number. What Is The

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Understanding and solving algebraic word problems can sometimes be challenging, especially when they involve multiple conditions and relationships between numbers. One such problem is: The sum of two numbers is 43. One number is five less than three times the other number. What is the value of each number? This type of problem not only tests your algebraic skills but also your ability to translate words into mathematical equations and solve for unknown variables.

In this comprehensive guide, we will explore the problem step-by-step, including how to set up equations, solve for the unknowns, and interpret the results. We will also discuss common mistakes, strategies for approaching similar problems, and practical tips to improve your algebraic reasoning.

Understanding the Problem

Before diving into the solution, it's essential to carefully interpret the problem statement:

- The sum of two numbers is 43.

This indicates that if we denote the two numbers as x and y , then:

$$x + y = 43$$

- One number is five less than three times the other number.

This describes a relationship between the two numbers.

If we assume x is the first number and y is the second, then:

$$x = 3y - 5$$

or alternatively:

$$y = (x + 5) / 3$$

The key here is to understand which variable we assign to which number, but since the problem is symmetric, we can choose either as the "first" or "second" number. Consistency is crucial.

Setting Up the Equations

Once the problem is understood, the next step is to translate the word problem into algebraic equations.

Choosing Variables

- Let's define:

- x = the first number
- y = the second number

Formulating the Equations

Based on the problem:

1. The sum of the two numbers:

$$x + y = 43$$

2. The relationship between the two:

$$x = 3y - 5$$

Alternatively, if we decide to express y in terms of x :

- From the second statement:

$$y = (x + 5) / 3$$

Either approach works; choose the one that simplifies the calculations best.

Solving the System of Equations

With the equations set, the next step is to solve for the variables.

Method 1: Substitution

Using the second equation:

$$x = 3y - 5$$

Substitute into the first:

$$(3y - 5) + y = 43$$

Combine like terms:

$$4y - 5 = 43$$

Add 5 to both sides:

$$4y = 48$$

Divide both sides by 4:

$$y = 12$$

Now, find x using $x = 3y - 5$:

$$x = 3(12) - 5 = 36 - 5 = 31$$

Solution:

- First number (x) = 31
- Second number (y) = 12

Method 2: Using the other form

If we choose to express y as $(x + 5) / 3$, substitute into the sum:

$$x + (x + 5) / 3 = 43$$

Multiply through by 3 to clear the denominator:

$$3x + x + 5 = 129$$

Combine like terms:

$$4x + 5 = 129$$

Subtract 5:

$$4x = 124$$

Divide both sides by 4:

$$x = 31$$

Find y:

$$y = (x + 5) / 3 = (31 + 5) / 3 = 36 / 3 = 12$$

Again, the same solution: $x = 31$, $y = 12$.

Interpreting and Verifying the Solution

Once the numbers are found, it's crucial to verify their correctness.

Verification Steps

- Check the sum:

- $31 + 12 = 43$??

- Check the relationship:

- Is 31 five less than three times 12?
 $3 \times 12 = 36$
 $36 - 5 = 31$??

Since both conditions are satisfied, the solution is correct.

Practical Applications and Related Problems

Understanding how to solve such problems can be applied to various real-life situations:

Financial Planning

- Calculating the distribution of funds where one account has a specific relation to another.

Physics and Engineering

- Determining quantities where one parameter depends on another, such as force and mass relationships.

Statistics and Data Analysis

- Finding unknown data points based on known totals and relationships.

Common Mistakes to Avoid

While solving these problems, be mindful of typical errors:

- **Incorrect Variable Assignment:** Mixing up which number is x or y can lead to wrong solutions.
- **Misinterpreting the Relationship:** Ensure the relation "five less than three times the other" is properly translated into the equation.
- **Arithmetic Errors:** Double-check calculations, especially during substitution and simplification.
- **Overlooking Both Conditions:** Always verify that the solution satisfies both the sum and the relationship.

Tips for Solving Similar Word Problems

To approach similar problems effectively:

1. **Read Carefully:** Identify what is given and what needs to be found.
2. **Define Variables:** Assign symbols to unknown quantities.
3. **Translate Words into Equations:** Be precise in translating relationships.
4. **Choose the Simplest Method:** Use substitution or elimination based on the problem.
5. **Solve Systematically:** Follow algebraic steps carefully.
6. **Verify Solutions:** Check whether the solutions satisfy all conditions.

Conclusion

Solving for two numbers based on their sum and a specific relationship involves careful translation of words into algebraic equations, strategic choice of variables, and systematic solving. In the example where the sum is 43, and one number is five less than three times the other, the solution reveals that the numbers are 31 and 12. Mastering this process enhances algebraic reasoning and problem-solving skills, essential for tackling a wide range of mathematical challenges.

Remember, practice makes perfect. Regularly working through similar problems will build confidence and sharpen your analytical skills. Whether in academic settings, practical scenarios, or competitive exams, understanding these foundational concepts will serve you well.

Meta Description:

Learn how to solve the problem "The sum of two numbers is 43, and one number is five less than three times the other" with step-by-step guidance, algebraic techniques, and practical tips for mastering similar word problems.

Frequently Asked Questions

What are the two numbers if their sum is 43 and one number is five less than three times the other?

Let the first number be x and the second be y . Given that $x + y = 43$ and $x = 3y - 5$. Substituting x into the first equation: $(3y - 5) + y = 43 \Rightarrow 4y - 5 = 43 \Rightarrow 4y = 48 \Rightarrow y = 12$. Then $x = 3(12) - 5 = 36 - 5 = 31$. So, the numbers are 31 and 12.

How do you set up equations to find two numbers where their sum is 43 and one is five less than three times the other?

Assign variables to the numbers, for example, x and y . Write the equations: $x + y = 43$ and $x = 3y - 5$. Use substitution or elimination to solve for the variables.

What is the solution to the problem: The sum of two numbers is 43, and one number is five less than three times the other?

The numbers are 31 and 12. The first is 31, the second is 12, satisfying both conditions.

Can you explain step-by-step how to find the two numbers in this problem?

Yes. First, set x and y as the numbers. Write equations: $x + y = 43$ and $x = 3y - 5$. Substitute x in the first equation: $(3y - 5) + y = 43$. Simplify: $4y - 5 = 43$. Add 5: $4y = 48$. Divide by 4: $y = 12$. Then find x : $x = 3(12) - 5 = 36 - 5 = 31$. The numbers are 31 and 12.

What mathematical concepts are used to solve this problem?

This problem involves systems of linear equations and substitution method to find the two unknown numbers.

Is there an alternative way to solve for the two numbers besides substitution?

Yes, you can also use the elimination method or graphing to find the solution, but substitution is usually the simplest for this type of problem.

What are common mistakes to watch out for when solving this problem?

Common mistakes include mixing up the variables, incorrect substitution, or algebraic errors when simplifying equations. Double-check calculations to avoid these errors.

How can this problem be extended to find different pairs of numbers with similar conditions?

You can modify the sum or the relationship between the numbers and set up new equations accordingly. Solving the system will give you different pairs that satisfy the new conditions.

What real-life situations can be modeled using this type of problem?

This problem models situations involving resource allocation, budgeting, or any scenario where two quantities are related linearly and need to sum to a specific total.

Additional Resources

The Sum Of Two Numbers Is 43. One Number Is Five Less Than Three Times The Other Number. What Is The?

In the realm of mathematics, word problems serve as essential tools for developing critical thinking, algebraic reasoning, and problem-solving skills. Among these, linear equations derived from real-world scenarios help students and enthusiasts alike grasp the practical applications of abstract concepts. One such intriguing problem involves two numbers with a specified sum and a relationship between them, prompting a detailed analytical approach to uncover their values. This article meticulously examines this problem, highlighting the process of translating words into mathematical expressions, solving the resulting equations, and understanding the underlying principles.

Understanding the Problem: Context and Key Information

Before diving into the solution, it is crucial to parse the problem statement carefully. The problem reads:

"The sum of two numbers is 43. One number is five less than three times the other number. What is the...?"

While the question is incomplete in the prompt, it is standard in algebraic word problems that the question asks: "What are the two numbers?" or "Find the two numbers."

Given this, the key pieces of information are:

- The sum of two numbers: 43
- A relationship between the two numbers: One number is five less than three times the other number

This problem involves two unknown numbers, which we will denote as variables, and the goal is to find their specific values.

Step 1: Defining Variables and Setting Up Equations

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

Assigning Variables

Let:

- x = the first number
- y = the second number

Translating Words into Mathematical Expressions

Based on the problem:

- The sum of the two numbers is 43:

```
\[
x + y = 43
\]
```

- One number is five less than three times the other:

```
\[
\text{(say, } y \text{)} = 3x - 5
\]
```

or vice versa. But the wording suggests "One number" refers to a specific relation, so we can choose:

```
\[
y = 3x - 5
\]
```

This is a straightforward approach, assuming y is described as five less than three times x .

Summary of Equations:

```
\[
\begin{cases}
x + y = 43 \\
y = 3x - 5
\end{cases}
\]
```

Step 2: Solving the System of Equations

Now, the problem reduces to solving the system of equations:

```
\[
\begin{cases}
x + y = 43 \\
y = 3x - 5
\end{cases}
\]
```

Substituting for y

Substitute the second equation into the first:

```
\[
x + (3x - 5) = 43
\]
```

Simplify:

```
\[
x + 3x - 5 = 43
\]
```

```
\[
4x - 5 = 43
\]
```

Add 5 to both sides:

```
\[
4x = 48
\]
```

Divide both sides by 4:

```
\[
x = 12
\]
```

Finding y

Use the second equation:

```
\[
y = 3x - 5 = 3(12) - 5 = 36 - 5 = 31
\]
```

Thus, the two numbers are:

```
\[
x = 12, \quad y = 31
\]
```

Step 3: Verifying the Solution

Verification ensures the solution satisfies all the conditions:

- Sum check:

```
\[
12 + 31 = 43 \quad \checkmark
\]
```

- Relationship check:

```
\[
y = 3x - 5 \rightarrow 31 = 3 \times 12 - 5 \rightarrow 31 = 36 - 5
\rightarrow 31 = 31 \quad \checkmark
\]
```

Both conditions hold true, confirming the solution's correctness.

Analytical Insights and Broader Context

Significance of the Problem

This problem exemplifies fundamental algebraic principles: translating word descriptions into equations, using substitution methods, and verifying solutions. Such problems are foundational in understanding linear relationships and are widely applicable in economics, engineering, and everyday decision-making.

Learning Points

- Variable Assignment: Properly defining variables is crucial for clarity.
- Equation Formation: Converting descriptive language into algebraic expressions requires careful reading.
- Substitution Method: An effective strategy for solving systems of equations.
- Verification: Ensures solutions are consistent with original conditions.

Common Pitfalls and How to Avoid Them

- Misinterpreting the relationship: Clarify ambiguous phrases; in this case, "five less than three times the other" clearly indicates the form of the equation.
- Incorrect variable assignment: Ensure variables are consistently used throughout.
- Arithmetic errors: Double-check calculations at each step.

Extensions and Related Problems

This problem can serve as a gateway to more complex scenarios involving multiple variables or nonlinear relationships. For example:

- Changing the sum: What if the sum of the two numbers is different?
- Altering the relationship: How does the solution change if the relationship is "two less than four times the other"?
- Multiple solutions: Under what conditions do multiple solutions exist?

By exploring variations, students can deepen their understanding of algebraic methods and their applications.

Practical Applications of Such Problems

While this problem might seem purely academic, the skills involved have real-world relevance:

- Financial Calculations: Determining investment splits or loan repayments based on relationships.
- Business Planning: Allocating resources proportionally based on certain constraints.
- Science and Engineering: Modeling relationships between variables like speed, time, and distance.

Understanding how to set up and solve such problems empowers individuals to tackle diverse challenges with quantitative rigor.

Conclusion: The Power of Algebra in Problem Solving

The problem of finding two numbers given their sum and a specific relational condition exemplifies the elegance and utility of algebra. Through systematic variable assignment, equation formulation, substitution, and verification, we arrive at a clear solution—the two numbers are 12 and 31. Beyond solving this particular problem, the process illustrates essential algebraic techniques that form the backbone of quantitative reasoning. Mastery of these skills not only enhances mathematical literacy but also fosters analytical thinking applicable across disciplines and everyday life.

In essence, problems that at first glance may seem complex become manageable once broken down into their core components and approached with logical rigor. The ability to translate words into equations, manipulate those equations effectively, and interpret the results is a vital competency that underpins advanced mathematics and critical thinking.

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