Lisa Is 9 Years Younger Than Her Brother Paul. Seven Years Ago Pual Was Four Times As Old As Lisa. How

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Understanding the relationship between siblings' ages can often seem like a complex puzzle, especially when given multiple time points and ratios. In this article, we will explore how to determine the current ages of Lisa and Paul given the clues: Lisa is nine years younger than her brother Paul, and seven years ago, Paul was four times as old as Lisa. We will analyze this problem step-by-step, applying algebraic methods to uncover their ages now and in the past, providing clear explanations for each stage of the process.

Setting Up the Problem: Defining Variables

Before delving into calculations, it’s essential to establish variables that represent the unknown ages.

Assigning Variables

- Let **L** be Lisa's current age.
- Let **P** be Paul's current age.

Given the information:

- Lisa is 9 years younger than Paul: $L = P - 9$.

Seven years ago:

- Lisa's age was $L - 7$.
- Paul's age was $P - 7$.

The key condition:

- Seven years ago, Paul was four times as old as Lisa: $P - 7 = 4(L - 7)$.

Now, our goal is to find the current ages, L and P, satisfying these conditions.

Formulating the Equations

Using the variables and conditions, we can set up equations to solve for L and P.

Equation 1: Age Difference

- $L = P - 9$.

Equation 2: Age Ratio Seven Years Ago

- $P - 7 = 4(L - 7)$.

By substituting Equation 1 into Equation 2, we eliminate one variable and solve for the other.

Solving the Equations Step-by-Step

This section guides you through solving the equations algebraically to find the ages.

Substituting Values

- Replace **L** with **P - 9** in Equation 2:

P - 7 = 4((P - 9) - 7)

Simplifying the Equation

- Simplify inside the parentheses:

P - 7 = 4(P - 9 - 7)

- Calculate *P - 9 - 7 = P - 16*:

P - 7 = 4(P - 16)

- Distribute 4:

P - 7 = 4P - 64

Solving for P

- Rearrange the equation:

P - 7 = 4P - 64

- Subtract *4P* from both sides:

P - 4P - 7 = -64

- Simplify:

-3P - 7 = -64

- Add 7 to both sides:

-3P = -57

- Divide both sides by -3:

P = 19

Finding Lisa's Age

- Recall **L = P - 9**:

L = 19 - 9 = 10

Result: Currently, Lisa is 10 years old, and Paul is 19 years old.

Verifying the Solution

It's essential to verify that our solution satisfies all the conditions of the problem.

Check the Age Difference

- Lisa's age: 10

- Paul's age: 19

- Difference: 19 - 10 = 9, which matches the problem statement.

Check the Seven Years Ago Condition

- Seven years ago:

- Lisa: 10 - 7 = 3

- Paul: 19 - 7 = 12

- Is Paul four times as old as Lisa?

- 4 3 = 12, which matches Paul's age seven years ago.

Since both conditions are satisfied, our solution is correct.

Understanding the Practical Implications of Age Problems

Age-related word problems like this are common in math exercises because they help develop algebraic thinking and problem-solving skills. They often involve setting up equations based on given relationships and solving for unknowns. Understanding how to translate words into mathematical expressions is a valuable skill applicable in various real-life contexts, such as planning, demographics, and even in fields like finance and healthcare.

Key Takeaways

- Define variables clearly to translate word problems into equations.

- Use substitution to simplify systems of equations.

- Always verify your solutions against original conditions to ensure accuracy.

- Practice with different scenarios to strengthen algebraic reasoning.

Additional Examples of Age Problems

To deepen your understanding, here are some similar age-related problems you might encounter:

Example 1: A Parent and Child

- The parent is 30 years older than the child.
- Ten years ago, the parent was five times as old as the child.
- Find their current ages.

Example 2: Siblings with Future Ages

- Two siblings are currently 8 and 14 years old.
- In how many years will the older sibling be twice the age of the younger?

Conclusion: Solving Age Problems with Algebra

By carefully defining variables, translating words into equations, and verifying solutions, you can effectively solve complex age-related problems. In the specific case of Lisa and Paul, we determined that Lisa is currently 10 years old, and Paul is 19 years old, satisfying all the problem's conditions. Mastering these techniques enhances your mathematical reasoning and prepares you for tackling a wide range of real-world problems involving ratios, differences, and time-based calculations.

Remember, the key to success is a systematic approach: understand the problem, set up the correct

equations, solve step-by-step, and verify your answers. With practice, solving age puzzles becomes more intuitive and enjoyable.

Frequently Asked Questions

How much younger is Lisa than her brother Paul?

Lisa is 9 years younger than Paul.

How can we determine Lisa and Paul's current ages based on the information?

By setting variables for their ages and creating equations based on the given relationships, then solving for their current ages.

What is the equation representing the current age difference between Lisa and Paul?

Since Lisa is 9 years younger, if Paul is P years old, Lisa is P - 9 years old.

How does the information from seven years ago help solve their current ages?

Seven years ago, Paul's age was P - 7, and Lisa's age was (P - 9) - 7 = P - 16; this helps create an equation based on the given ratio.

What is the equation representing the ages seven years ago?

Seven years ago, Paul was 4 times as old as Lisa: P - 7 = 4 (P - 16).

How do we solve for Paul's current age using the equation from seven years ago?

By expanding and simplifying the equation: P - 7 = 4P - 64; then solving for P.

What is Paul's current age after solving the equation?

Paul's current age is 57 years old.

What is Lisa's current age based on Paul's age?

Lisa is 9 years younger, so she is 48 years old.

What is the final answer to the problem about Lisa and Paul’s ages?

Lisa is currently 48 years old, and Paul is 57 years old.

How can this problem be generalized for similar age problems?

By setting variables for ages, translating the word problem into equations, and solving the system of equations accordingly.

Additional Resources

Age Difference Analysis: Unraveling the Relationship Between Lisa and Paul

Understanding the relationship between ages in a family setting often involves a blend of basic arithmetic and logical reasoning. In this detailed exploration, we will dissect the problem: Lisa is 9 years younger than her brother Paul. Seven years ago, Paul was four times as old as Lisa. This investigation not only clarifies the specific ages but also demonstrates a systematic approach to similar age-related word problems—a skill valuable in mathematical reasoning and real-world applications.

Introducing the Problem: Context and Initial Data

The problem presents two key pieces of information:

- Current age difference between Lisa and Paul.
- Historical age relationship between the two, specifically seven years ago.

Let's restate the given data clearly:

1. Lisa is 9 years younger than Paul.
2. Seven years ago, Paul was four times as old as Lisa.

This information forms the foundation for establishing algebraic expressions and solving for their current ages.

Breaking Down the Information: Establishing Variables

To analyze the problem effectively, we introduce variables:

- Let L represent Lisa's current age.
- Let P represent Paul's current age.

Based on the first piece of information:

L = P - 9 (Equation 1)

This simple linear relationship states that Lisa's age is nine years less than Paul's.

Translating the Historical Age Condition

The second piece of information involves ages seven years ago:

- Lisa's age seven years ago: L - 7
- Paul's age seven years ago: P - 7

Given that, seven years ago, Paul was four times as old as Lisa, we can write:

P - 7 = 4 × (L - 7)

This is our second key equation to solve.

Formulating the Mathematical Model

Now, we have two equations:

1. L = P - 9
2. P - 7 = 4(L - 7)

The goal is to find current ages L and P satisfying both.

Solving the System of Equations

Let's proceed step-by-step:

Step 1: Substitute Equation 1 into Equation 2

From Equation 1, L = P - 9, substitute into Equation 2:

P - 7 = 4[(P - 9) - 7]

Simplify inside the brackets:

P - 7 = 4(P - 9 - 7)

P - 7 = 4(P - 16)

Step 2: Expand and Simplify

Distribute the 4:

P - 7 = 4P - 64

Step 3: Isolate P

Bring all P terms to one side:

P - 4P = -64 + 7

-3P = -57

Divide both sides by -3:

P = 19

Now, having P = 19, find L using Equation 1:

L = P - 9 = 19 - 9 = 10

Step 4: Verify the solution

Check whether the ages seven years ago satisfy the second condition:

- Lisa's age seven years ago: L - 7 = 10 - 7 = 3
- Paul's age seven years ago: P - 7 = 19 - 7 = 12

Is Paul four times as old as Lisa at that time?

Is 12 = 4 × 3? Yes, 12 = 12. The condition holds.

Interpreting the Results: Current Ages

Based on the calculations:

- Lisa's current age (L): 10 years

- Paul's current age (P): 19 years

These ages satisfy both the initial age difference and the historical age relationship.

Analysis of the Age Difference and Historical Context

Let's analyze the implications:

- The current age difference is 9 years, aligning with the initial statement.
- Seven years ago, Lisa was 3 years old, and Paul was 12.
- The age ratio at that time confirms Paul was four times as old as Lisa, satisfying the problem constraints.

Additional Insights and Real-World Relevance

Understanding such age problems aids in developing critical thinking and algebraic problem-solving skills, applicable in various fields such as:

- Education: Enhancing quantitative reasoning.
- Family Planning: Estimating ages and timelines.
- Historical Data Analysis: Interpreting age-related data over time.
- Legal Contexts: Determining age-related eligibility.

Furthermore, this problem showcases how initial known differences and historical relationships can be

combined with algebra to uncover unknown current states—an essential approach in data modeling and predictive analytics.

Potential Variations and Complexities

While this problem is straightforward, similar problems can be extended or made more complex by:

- Introducing multiple siblings with varying age differences.
- Changing the time frame (e.g., 10 years ago instead of 7).
- Incorporating additional conditions, like age sum, or other ratios.
- Considering real-life constraints, such as age restrictions.

These variations serve as excellent exercises to deepen understanding of algebraic modeling.

Summary and Final Remarks

In conclusion, by carefully translating the word problem into algebraic equations, we determined that:

- Lisa is currently 10 years old.
- Paul is currently 19 years old.

This analysis highlights the importance of systematic problem-solving techniques, precise translation of word problems, and verification of results through back-substitution. These skills are not only crucial in academic contexts but are also valuable for practical decision-making and analytical reasoning in

everyday life.

Understanding the relationships between ages over time fosters a deeper appreciation of how simple algebra can decode complex-sounding scenarios, making it an invaluable tool in both educational and professional settings.

Final note: When encountering similar age problems, always start by defining variables, translating conditions into equations, and verifying solutions through substitution. This methodical approach ensures clarity and accuracy in deriving meaningful insights from the data.

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