

Asha Is 4 Years Less Than 3 Times The Age Of Her Daughter. If The Sum Of Their Ages Is 48 Years. Find

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Understanding age-related word problems is an essential skill in mathematics that helps develop logical reasoning and problem-solving abilities. In this article, we will explore a specific age problem involving Asha and her daughter. The problem states that Asha's age is 4 years less than three times her daughter's age, and the combined ages of both are 48 years. Our goal is to determine the current ages of Asha and her daughter using algebraic methods, providing a step-by-step solution along with tips for solving similar problems.

Analyzing the Problem

Before jumping into calculations, it's crucial to understand what the problem is asking and identify the key information:

- Asha's age: Expressed as "4 years less than 3 times her daughter's age."
- Sum of ages: The total of Asha's age and her daughter's age is 48 years.
- Objective: Find the current ages of Asha and her daughter.

This kind of problem involves translating word statements into algebraic equations and then solving those equations systematically.

Step-by-Step Approach to Solve the Problem

To solve the problem efficiently, follow these steps:

Step 1: Define Variables

Assign variables to unknown quantities:

- Let D = the age of the daughter

- Let A = the age of Asha

Step 2: Translate Word Statements into Equations

Based on the problem statement:

- Asha's age is 4 years less than three times her daughter's age:

$$\begin{aligned} & \backslash[\\ A &= 3D - 4 \\ & \backslash] \end{aligned}$$

- The sum of their ages is 48:

$$\begin{aligned} & \backslash[\\ A + D &= 48 \\ & \backslash] \end{aligned}$$

Step 3: Substitute and Formulate a Single Equation

Using the first equation, substitute A in the second:

$$\begin{aligned} & \backslash[\\ (3D - 4) + D &= 48 \\ & \backslash] \end{aligned}$$

Simplify:

$$\begin{aligned} & \backslash[\\ 3D - 4 + D &= 48 \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ 4D - 4 &= 48 \\ & \backslash] \end{aligned}$$

Step 4: Solve for the Variable

Add 4 to both sides:

$$\begin{aligned} & \backslash[\\ 4D &= 52 \\ & \backslash] \end{aligned}$$

Divide both sides by 4:

```
\[
D = 13
\]
```

Now that we know the daughter's age, find Asha's age:

```
\[
A = 3 \times 13 - 4 = 39 - 4 = 35
\]
```

Final Answer

- Asha's age: 35 years
- Daughter's age: 13 years

Verification of the Solution

Always verify your solution by plugging the values back into the original conditions:

- Check the sum:

```
\[
35 + 13 = 48 \quad \text{(Correct)}
\]
```

- Check the relation:

```
\[
3 \times 13 - 4 = 39 - 4 = 35 \quad \text{(Matches Asha's age)}
\]
```

Since both conditions are satisfied, the solution is correct.

Additional Tips for Solving Age Word Problems

- Identify keywords: Words like "more than," "less than," "sum," "difference," indicate the operation.

- Define variables carefully: Assign clear and consistent variables to the unknowns.
- Translate sentences systematically: Convert every statement into an algebraic expression.
- Check units and logic: Ages are positive integers; verify that solutions make sense.
- Verify your answer: Substitute your solutions back into the original statements.

Common Mistakes to Avoid

- Mixing variables: Keep track of which variable represents which person.
- Incorrect translation: Misinterpreting the word problem can lead to wrong equations.
- Overlooking the context: Remember ages are positive integers; avoid negative solutions.
- Neglecting verification: Always verify the solution to ensure accuracy.

Additional Practice Problems

To strengthen your understanding, try solving these similar age problems:

1. Problem: Sam is 5 years older than twice his sister's age. If the sum of their ages is 29, find their ages.
2. Problem: A father is 30 years older than his son. The sum of their ages is 50. Find their ages.
3. Problem: The combined age of two friends is 36 years. One is 4 years older than the other. Find their ages.

Conclusion

Age-related word problems can seem challenging at first, but with a structured approach, they become manageable. Remember to carefully define variables, translate sentences accurately into algebraic equations, and verify your solutions. The problem involving Asha and her daughter demonstrates how algebra can be used to solve real-world problems efficiently. Practice with similar problems to build confidence and improve your problem-solving skills in mathematics.

SEO Keywords and Phrases

- Age word problems
- Algebra age problems
- Solving age problems step-by-step
- Age problem examples
- How to solve age equations
- Age problem solutions
- Math problems involving ages
- Age problems for students
- Math practice problems on ages
- Algebraic equations for age problems

By mastering the techniques outlined in this article, you can confidently approach and solve various age-related word problems, enhancing your mathematical reasoning and problem-solving expertise.

Frequently Asked Questions

What is the age of Asha if she is 4 years less than 3 times her daughter's age, and their combined age is 48?

Let the daughter's age be x . Then Asha's age is $3x - 4$. So, $x + (3x - 4) = 48$. Solving: $4x - 4 = 48 \rightarrow 4x = 52 \rightarrow x = 13$. Therefore, Asha is $3(13) - 4 = 39 - 4 = 35$ years old.

How do you set up equations to find Asha and her daughter's ages based on the given conditions?

Let the daughter's age be x . Since Asha is 4 years less than 3 times her daughter's age, Asha's age is $3x - 4$. The sum of their ages is 48, so the equation is $x + (3x - 4) = 48$. Solving this gives their individual ages.

What is the method to solve for the daughter's age in this problem?

Express Asha's age in terms of her daughter's age, set up the equation with the sum of their ages, and solve for x . In this case, $x + (3x - 4) = 48$, which simplifies to $4x = 52$, so $x = 13$.

If the daughter's age increases by 2 years, how does that affect Asha's age?

Since Asha's age is 3 times her daughter's age minus 4, increasing the daughter's age by 2 years increases Asha's age by 3 times 2, which is 6 years. So, Asha's new age becomes $(3(x+2)) - 4$.

Can you verify the ages of Asha and her daughter using the total sum provided?

Yes. With the daughter's age as 13, Asha's age is 35. Their sum is $13 + 35 = 48$, which matches the given total, confirming the solution.

What is the importance of forming an equation in solving age problems like this?

Forming an equation translates the word problem into a mathematical form, allowing for systematic solving and ensuring accuracy in finding the ages.

How would the solution change if the sum of their ages was 50 instead of 48?

Set up the same equations: $x + (3x - 4) = 50$. Simplifying gives $4x - 4 = 50 \rightarrow 4x = 54 \rightarrow x = 13.5$. Then, Asha's age is $3(13.5) - 4 = 40.5 - 4 = 36.5$ years.

Is it always necessary to assume the daughter's age as x in such problems?

Using a variable like x helps to set up and solve the problem systematically. It simplifies handling unknowns and makes the problem easier to analyze mathematically.

What real-life situations can this type of age problem help us understand better?

This problem helps in understanding relationships between ages, planning for future events, or analyzing age differences in family or social contexts.

Additional Resources

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In the realm of algebra and age-related word problems, few scenarios are as illustrative of how simple equations can unlock real-world insights. Today, we explore a classic problem involving Asha and her daughter—an engaging

puzzle that combines basic algebra with logical reasoning. Understanding such problems not only sharpens mathematical skills but also fosters critical thinking, which is invaluable across various disciplines and everyday decision-making.

This article aims to dissect the problem thoroughly, guiding readers through the process of translating a word problem into algebraic expressions, setting up equations, and solving them systematically. Whether you're a student, educator, or someone interested in logical puzzles, this detailed walkthrough will enhance your problem-solving toolkit.

Understanding the Problem: Breaking Down the Statement

Before diving into the algebraic formulations, it's crucial to interpret the problem carefully. The statement reads:

"Asha is 4 years less than 3 times the age of her daughter. If the sum of their ages is 48 years, find their individual ages."

At first glance, this appears straightforward, but certain nuances require clarification:

- Asha's age relative to her daughter's: "4 years less than 3 times" suggests a specific relationship between their ages.
- Sum of ages: The total combined age of Asha and her daughter is given as 48 years.
- Objective: Determine each of their ages.

Understanding these components ensures accurate translation into mathematical expressions.

Defining Variables: Assigning Symbols to Unknowns

To translate the word problem into an algebraic framework, assign variables to represent the unknown quantities:

- Let D = Age of the daughter (in years).
- Let A = Age of Asha (in years).

This step is fundamental because it simplifies the process of creating equations based on the problem's statements.

Formulating the Mathematical Relationships

With variables assigned, the next step is to express the relationships described in the problem as equations.

Relationship 1: Asha's Age in Terms of Her Daughter's Age

The statement:

> "Asha is 4 years less than 3 times the age of her daughter."

can be written as:

$$A = 3D - 4$$

This equation expresses Asha's age directly in terms of her daughter's age.

Relationship 2: Sum of Their Ages

The combined ages:

> "If the sum of their ages is 48 years"

translates to:

$$A + D = 48$$

This is a straightforward linear equation involving both variables.

Constructing the System of Equations

Now, with the two relationships formulated, we have a system of equations:

1. $A = 3D - 4$
2. $A + D = 48$

Substituting the expression for A from the first equation into the second allows us to solve for D.

Solving the Equations Step-by-Step

Let's proceed to find the value of D (daughter's age) and then A (Asha's age).

Step 1: Substitute A from Equation 1 into Equation 2

Given:

$$- A = 3D - 4$$

Plug into:

$$- A + D = 48$$

becomes:

$$- (3D - 4) + D = 48$$

Step 2: Simplify and solve for D

Combine like terms:

$$- 3D + D - 4 = 48$$

which simplifies to:

$$- 4D - 4 = 48$$

Add 4 to both sides:

$$- 4D = 52$$

Divide both sides by 4:

$$- D = 13$$

Interpretation: The daughter is 13 years old.

Step 3: Find Asha's age

Using Equation 1:

$$- A = 3D - 4$$

Plugging in $D = 13$:

- $A = 3(13) - 4 = 39 - 4 = 35$

Interpretation: Asha is 35 years old.

Verifying the Solution

It's essential to verify the solution to ensure consistency.

- Sum of ages:

$35 \text{ (Asha)} + 13 \text{ (daughter)} = 48$, which matches the given total.

- Relationship check:

Is Asha's age 4 years less than 3 times her daughter's age?

$$3 \times 13 = 39$$

$$39 - 4 = 35$$

Yes, which confirms the correctness of the solution.

Implications and Real-World Context

While the problem appears simple, it provides insight into the practical application of algebra in everyday life:

- Family age dynamics: Understanding age relationships can inform family planning, inheritance planning, or health assessments.
- Educational value: Such problems reinforce the importance of translating words into mathematical expressions—a fundamental skill in science, engineering, economics, and data analysis.
- Problem-solving confidence: Successfully solving these problems builds confidence in tackling more complex, multi-variable scenarios.

Additional Tips for Solving Similar Age

Problems

When faced with word problems involving ages or other relationships, keep these strategies in mind:

- Identify variables clearly: Assign symbols to unknown quantities.
- Translate relationships carefully: Pay attention to words like "more than," "less than," "times," and "sum."
- Set up equations systematically: Use the relationships to form equations.
- Check your work: Verify that your solutions satisfy all parts of the problem.
- Consider logical constraints: For example, ages should be positive integers unless otherwise specified.

Conclusion: The Power of Algebra in Understanding Life Situations

The problem of determining Asha and her daughter's ages exemplifies how algebra provides a powerful framework to solve real-world puzzles. By carefully interpreting the language, assigning appropriate variables, and setting up equations, one can uncover solutions that are both logical and precise.

This approach not only enhances mathematical literacy but also demonstrates the relevance of algebra in everyday life. Whether estimating ages, planning schedules, or analyzing data, the ability to translate words into equations is an invaluable skill—transforming complex narratives into solvable mathematical problems.

As we've seen through this detailed exploration, mastering such problems fosters analytical thinking, sharpens problem-solving skills, and deepens our understanding of how mathematical principles underpin many aspects of our daily experiences.

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