If You Square My Age And Subtract 28 Times My Age, The Result Is 60. What Is My Age?

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This intriguing statement presents a mathematical puzzle that invites us to determine an individual's age based on a specific algebraic condition. Such problems are not only engaging but also serve as excellent exercises to sharpen our problem-solving skills and understanding of algebraic concepts. In this article, we'll explore how to translate this word problem into an algebraic equation, solve it systematically, and discuss its broader implications and applications.

Understanding the Problem

Before diving into the calculations, it's essential to interpret the problem correctly. The statement reads:

"If you square my age and subtract 28 times my age, the result is 60."

This phrase can be broken down into parts:

- "Square my age" suggests taking the age (let's denote it as x) and calculating x^2.
- "Subtract 28 times my age" indicates subtracting 28 times x, which is $28x$.
- The entire operation results in 60.

Therefore, the problem asks: What is the value of x (the age) satisfying this condition?

Formulating the Mathematical Equation

Translating the word problem into an algebraic equation, we get:

$x^2 - 28x = 60$

This quadratic equation is the foundation for solving the problem. Our goal is to find the value(s) of x that satisfy this equation, representing the person's age.

Solving the Equation Step-by-Step

Let's go through the process of solving the quadratic equation:

$x^2 - 28x = 60$

Step 1: Bring all terms to one side to set the equation to zero:

$x^2 - 28x - 60 = 0$

Step 2: Identify the coefficients:

- Quadratic coefficient (a): 1
- Linear coefficient (b): -28
- Constant term (c): -60

Step 3: Apply the quadratic formula:

$x = [-b \pm \sqrt{(b^2 - 4ac)}] / (2a)$

Plugging in the values:

$x = [28 \pm \sqrt{((-28)^2 - 4\ 1\ (-60))}] / 2$

Step 4: Calculate the discriminant:

$(-28)^2 = 784$

$-4\ 1\ (-60) = 240$

Discriminant $D = 784 + 240 = 1024$

Step 5: Find the square root of the discriminant:

$\sqrt{1024} = 32$

Step 6: Compute the two possible solutions:

$x = [28 + 32] / 2 = 60 / 2 = 30$

$x = [28 - 32] / 2 = (-4) / 2 = -2$

Step 7: Interpret the solutions:

- Age cannot be negative in real-world context, so $x = -2$ is invalid.
- The valid solution is $x = 30$.

Thus, the person's age is 30 years.

Verifying the Solution

To ensure our solution is correct, substitute x = 30 back into the original statement:

- Square of age: $30^2 = 900$
- 28 times age: 28 30 = 840
- Subtract: 900 - 840 = 60

Since the result matches the given condition, our solution is confirmed.

Broader Implications and Applications of Such Problems

Mathematical puzzles like this are more than just academic exercises—they have real-world relevance and educational value.

Developing Problem-Solving Skills

Engaging with word problems enhances critical thinking, logical reasoning, and the ability to translate verbal information into mathematical models.

Applications in Various Fields

- Education: Teaching algebra and problem-solving techniques.
- Finance: Calculating interest, investments, and amortization schedules often involve quadratic equations.
- Engineering: Structural analysis and physics problems frequently require solving quadratic equations.

Tips for Solving Similar Word Problems

When faced with a word problem involving algebra, keep these tips in mind:

- Read the problem carefully and identify what is being asked.
- Translate the words into algebraic expressions step-by-step.
- Write the equation clearly and verify coefficients.

- Use the quadratic formula or factoring methods as appropriate.
- Check your solutions by substituting back into the original problem.

Conclusion

In summary, the problem "If you square my age and subtract 28 times my age, the result is 60" leads us to formulate and solve a quadratic equation, revealing that the individual's age is 30 years. Such problems exemplify how algebra allows us to model real-world scenarios and find solutions systematically. Whether used in education, engineering, or everyday reasoning, mastering the art of translating words into equations and solving them is an invaluable skill that deepens our understanding of mathematics and its applications.

Remember, every complex problem can be broken down into manageable steps—just like solving this puzzle!

Frequently Asked Questions

How do I set up the equation for the problem 'If you square my age and subtract 28 times my age, the result is 60'?

Let your age be x. The equation is $x^2 - 28x = 60$.

What is the first step to solve the quadratic equation $x^2 - 28x = 60$?

Rewrite the equation as $x^2 - 28x - 60 = 0$ to set it equal to zero.

How do I factor the quadratic equation $x^2 - 28x - 60 = 0$?

You can attempt to factor it directly or use the quadratic formula if factoring is difficult.

What is the quadratic formula used to find the roots of the equation $x^2 - 28x - 60 = 0$?

$x = [28 \pm \sqrt{(28^2 - 4\ 1\ (-60))}] / (2\ 1)$.

What are the solutions for x in the equation x^2 - 28x - 60 = 0?

Calculating the discriminant: 28^2 - 41(-60) = 784 + 240 = 1024. Thus, x = [28 ± √1024] / 2 = [28 ± 32] / 2, giving x = 30 or x = -2.

Which solution makes sense for the age problem: x = 30 or x = -2?

Since age cannot be negative, the valid answer is x = 30.

What is the final answer to the problem?

Your age is 30 years old.

Could the negative solution (x = -2) be relevant in any context?

No, age cannot be negative, so x = -2 is extraneous and not relevant.

How can I verify that my solution is correct?

Substitute x = 30 back into the original equation: 30^2 - 2830 = 900 - 840 = 60, confirming the solution is correct.

Additional Resources

If You Square My Age And Subtract 28 Times My Age, The Result Is 60. What Is My Age?

Mathematics often feels like an intricate puzzle, a riddle wrapped in numbers that beckons our curiosity. One such intriguing problem asks: If you square my age and subtract 28 times my age, the result is 60. What is my age? While appearing straightforward at first glance, this question invites us into the world of algebra—where words translate into equations, and logical reasoning guides us toward the solution. In this article, we’ll explore this problem comprehensively, unraveling the steps to find the age in question, and understanding the underlying principles that make algebra a powerful tool for solving real-world puzzles.

Understanding the Problem: Decoding the Word Problem

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

"If You Square My Age And Subtract 28 Times My Age, The Result Is 60."

contains several key components:

- "My Age": The unknown we need to determine, let's denote it as x.
- "Square My Age": mathematically, this is x^2.
- "Subtract 28 Times My Age": mathematically, this is $28x$.
- "The Result Is 60": the total after the subtraction equals 60.

Putting this into a mathematical form, the problem becomes:

$$ x^2 - 28x = 60 $$

This is a quadratic equation, a fundamental class of equations in algebra characterized by the highest exponent being 2.

Formulating the Equation: Turning Words into Math

The core step in solving word problems involving algebra is translating the verbal description into a formal equation. In this case:

- The phrase "square my age" translates to x^2.
- The phrase "subtract 28 times my age" becomes $-28x$.
- The phrase "the result is 60" indicates the entire expression equals 60.

Thus, the algebraic equation is:

$$
x^2 - 28x = 60
$$

To solve for x, we need to manipulate this quadratic equation into a standard form:

$$
ax^2 + bx + c = 0
$$

which leads us to rewrite the equation as:

$$
x^2 - 28x - 60 = 0
$$

Solving the Quadratic Equation: Methods and Step-by-Step Approach

Quadratic equations can be solved using several methods:

- Factoring
- Completing the square
- The quadratic formula

Given the coefficients, the quadratic formula offers a straightforward and reliable way to find roots, especially when factoring is not obvious.

The quadratic formula:

$$
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
$$

where a, b, and c are coefficients from the standard form $ax^2 + bx + c = 0$.

In our case:

$$
a = 1, \quad b = -28, \quad c = -60
$$

Applying the Quadratic Formula: Step-by-Step Calculation

Let's substitute the values into the quadratic formula:

$$
x = \frac{-(-28) \pm \sqrt{(-28)^2 - 4 \times 1 \times (-60)}}{2 \times 1}
$$

Simplify numerator and denominator:

$$
x = \frac{28 \pm \sqrt{784 - (-240)}}{2}
$$

Note that subtracting a negative is equivalent to adding:

$$
x = \frac{28 \pm \sqrt{784 + 240}}{2}
$$

Calculate inside the square root:

$$
784 + 240 = 1024
$$

Since 1024 is a perfect square (32^2), the square root simplifies nicely:

$$
x = \frac{28 \pm 32}{2}
$$

Now, evaluate the two possible solutions:

1. $x = \frac{28 + 32}{2} = \frac{60}{2} = 30$
2. $x = \frac{28 - 32}{2} = \frac{-4}{2} = -2$

Interpreting the Solutions: Which Age Makes Sense?

The solutions obtained are:

- 30
- -2

In the context of the problem, age cannot be negative, as negative age is not meaningful in real-world scenarios. Therefore, the only feasible solution is:

$$
\boxed{\text{The person's age is } 30 \text{ years}}
$$

This conclusion aligns with common sense—an age of 30 years fits naturally with the problem's context and constraints.

Verifying the Solution: Substituting Back into the Original Problem

To ensure correctness, substitute $x = 30$ into the original statement:

$$
x^2 - 28x = 60
$$

Calculate:

$$
30^2 - 28 \times 30 = 900 - 840 = 60
$$

The calculation confirms the solution is accurate, validating our algebraic process.

Broader Insights: Why Algebra Is Essential in Problem Solving

This problem exemplifies the power of algebra in translating real-life or word problems into a form that can be methodically solved. Algebra allows us to:

- Convert qualitative descriptions into quantitative equations.
- Use systematic methods (factoring, completing the square, quadratic formula) to find solutions.
- Verify solutions through substitution, ensuring accuracy and consistency.

Furthermore, understanding the nature of quadratic equations teaches us about the possible number of solutions and their relevance to real-world constraints.

Additional Considerations: When Multiple Solutions Arise

In other problems involving quadratic equations, solutions may be:

- Two real solutions: as in our example (30 and -2).
- One real solution: when the discriminant (the part under the square root) is zero.
- No real solutions: if the discriminant is negative, indicating the solutions are complex or imaginary.

This highlights the importance of calculating the discriminant:

$$
D = b^2 - 4ac
$$

to determine the nature of solutions before proceeding with calculations.

Practical Applications of Such Problems

While this problem is academic, similar algebraic reasoning is vital in fields such as:

- Engineering: designing systems where quadratic relations appear.
- Economics: modeling profit or cost functions.
- Physics: analyzing motion equations.
- Statistics: solving quadratic regression models.

Understanding how to set up and solve quadratic equations equips professionals and students alike with a versatile problem-solving skill.

Final Thoughts: Connecting Mathematics to Everyday Life

Solving for age in such problems might seem abstract, but it underscores a fundamental truth: mathematics is a universal language. Whether determining age, calculating trajectories, or optimizing processes, algebraic tools enable us to translate complex scenarios into solvable equations.

The problem, "If you square my age and subtract 28 times my age, the result is 60," reveals that the person is 30 years old. This solution, arrived at through systematic algebraic reasoning, exemplifies how mathematical literacy empowers us to decode and resolve everyday puzzles with clarity and confidence.

In conclusion, mastering algebraic techniques—particularly solving quadratic equations—opens doors to understanding a wide array of problems, both simple and complex. As we've seen, translating words into equations, applying the quadratic formula, and interpreting solutions are fundamental steps that make seemingly complicated puzzles approachable and solvable.

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