Given (x 7)2 = 36, Select The Values Of X.

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Understanding algebraic expressions and solving for unknown variables is a fundamental aspect of mathematics. The problem statement "Given (x 7)2 = 36, select the values of x" presents an algebraic equation that requires substitution, simplification, and solving to find the possible values of x. This article will guide you through the process step-by-step, providing clarity on the methods involved, and emphasizing key concepts such as algebraic manipulation, order of operations, and solving equations.

Understanding the Problem Statement

Before diving into the solution, it’s essential to interpret the given expression correctly.

What does (x 7)2 = 36 mean?

- The notation suggests an algebraic expression involving the variable x.
- Usually, in standard algebra, the notation "(x 7)2" could be interpreted as either:

1. The product of (x 7) and 2, i.e., (x 7) 2

2. The expression (x 7) raised to the power of 2, i.e., (x 7)^2

- The context and mathematical conventions suggest that the most common interpretation is:

(x 7) multiplied by 2, i.e., (x 7) 2 = 36

- Alternatively, if the problem intended an exponent, it might have been written as (x + 7)^2 or similar.

Note: Since the problem specifically states "Given (x 7)2 = 36" and uses no plus sign, the most logical interpretation is:

(x 7) 2 = 36

Step-by-Step Solution Process

Once the interpretation is clear, solving the equation involves a few straightforward algebraic steps.

Step 1: Write the equation explicitly

Based on the interpretation:

(x 7) 2 = 36

which simplifies to:

2 (x + 7) = 36

Note: The assumption here is that the "x 7" represents "x + 7"—a common notation in algebra, where the expression inside parentheses involves addition.

Important: If the original problem intended "x 7" as "x minus 7," it would be written as (x - 7). Since it isn’t specified, "x + 7" is the most conventional assumption.

Step 2: Simplify the equation

Divide both sides of the equation by 2 to isolate (x + 7):

(2 (x + 7)) / 2 = 36 / 2

which simplifies to:

x + 7 = 18

Solving for x

Now that the equation is simplified, solving for x involves basic algebraic operations.

Step 3: Isolate x

Subtract 7 from both sides:

x + 7 - 7 = 18 - 7

which simplifies to:

x = 11

Verify the Solution

Always verify your solution by substituting the value of x back into the original equation.

Substitute $x = 11$ into the expression:

$(11 + 7) 2 = ?$

Calculate:

$(18) 2 = 36$

Since the original equation equals 36, the solution $x = 11$ is correct.

Summary of the Solution

- The original problem was interpreted as: $(x + 7) 2 = 36$
- Simplify by dividing both sides by 2
- Resulted in $x + 7 = 18$
- Subtracted 7 from both sides to find $x = 11$
- Verified the solution by substitution

Alternative Interpretations and Solutions

While the above interpretation is the most straightforward, other interpretations could exist based on different notations.

1. If (x 7)2 means (x - 7)^2

Suppose the problem intended:

$(x - 7)^2 = 36$

Then, the steps involve:

- Take the square root of both sides:

$x - 7 = \pm\sqrt{36}$

- Simplify:

$x - 7 = \pm 6$

- Solve for x:

$x = 7 + 6 = 13$

or

$x = 7 - 6 = 1$

Solutions: $x = 13$ or $x = 1$

2. If (x 7)2 is interpreted as (x 7)^2

In that case:

$(x 7)^2 = 36$

- Take the square root:

$x 7 = \pm\sqrt{36}$

- Simplify:

$x 7 = \pm 6$

- Solve for x:

$x = \pm 6 / 7$

Solutions: $x = 6/7$ or $x = -6/7$

Key Concepts for Solving Algebraic Equations

Understanding the core principles involved in solving such equations is vital for tackling similar problems:

Algebraic Manipulation

- Combining like terms
- Using inverse operations (addition/subtraction, multiplication/division)
- Simplifying expressions

Order of Operations

- Parentheses first, then exponents, multiplication/division, addition/subtraction (PEMDAS)

Dealing with Square Roots and Exponents

- Recognize that squaring and square roots are inverse operations
- Remember that equations like $x^2 = a$ have two solutions: $x = \sqrt{a}$ and $x = -\sqrt{a}$

Validating Solutions

- Always substitute solutions back into the original equation to verify correctness

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Practical Applications of Solving Such Equations

Solving algebraic equations like the one discussed has numerous real-world applications:

- Calculating unknown quantities in physics and engineering
- Financial modeling and budgeting
- Computer science algorithms
- Data analysis and statistical modeling

Mastering these solving techniques enhances problem-solving skills and mathematical literacy.

Conclusion

In summary, the equation "Given (x 7)2 = 36" requires careful interpretation and systematic solving. Based on typical algebraic conventions, the most probable meaning is:

(x + 7) 2 = 36

which leads to the solution:

x = 11

However, alternative interpretations such as (x - 7)^2 = 36 or (x 7)^2 = 36 may also be valid, each yielding different solutions:

- x = 13 or 1 (if (x - 7)^2 = 36)
- x = 6/7 or -6/7 (if (x 7)^2 = 36)

Understanding the context and notation is crucial for accurate problem-solving. Practice with various forms of equations enhances your algebraic skills, enabling you to approach similar problems confidently and efficiently.

Meta-Description:
Learn how to interpret and solve the algebraic equation given as (x 7)2 = 36. This comprehensive guide explores different interpretations, step-by-step solutions, and practical applications for mastering algebraic problem-solving skills.

Frequently Asked Questions

What is the value of x in the equation $(x + 7)^2 = 36$?

$x = -13$ or $x = -5$

How do you solve for x in the equation $(x + 7)^2 = 36$?

Take the square root of both sides: $x + 7 = \pm 6$; then subtract 7 from both: $x = -7 \pm 6$, giving $x = -13$ or $x = -1$.

Are there more than two solutions for the equation $(x + 7)^2 = 36$?

No, there are exactly two solutions: $x = -13$ and $x = -1$.

What is the step to isolate x in the equation $(x + 7)^2 = 36$?

First, take the square root of both sides to get $x + 7 = \pm 6$, then solve for x.

Can the solutions for x be positive in the equation $(x + 7)^2 = 36$?

No, both solutions are negative: $x = -13$ and $x = -1$.

What is the significance of the ± symbol in solving $(x + 7)^2 = 36$?

It indicates that there are two solutions: one with a positive root and one with a negative root.

Is the equation $(x + 7)^2 = 36$ a quadratic equation?

Yes, because it can be expanded into a quadratic form and solved accordingly.

What are the general steps to solve equations of the form $(x + a)^2 = b$?

Take the square root of both sides, consider both positive and negative roots, then solve for x by subtracting a.

If $(x + 7)^2 = 36$, what is the value of x when $x + 7 = 6$?

$x = -1$.

If $(x + 7)^2 = 36$, what is the value of x when $x + 7 = -6$?

$x = -13$.

Additional Resources

Mathematics Problem-Solving: Unlocking the Values of X in $(x + 7)^2 = 36$

Understanding how to solve equations involving squared expressions is foundational in algebra. The problem Given $(x + 7)^2 = 36$, select the values of x offers a perfect example of applying algebraic principles to find all possible solutions. This article provides a comprehensive exploration of this problem, breaking down the steps, explaining core concepts, and offering insights into related mathematical techniques. Whether you're a student, educator, or math enthusiast, this detailed guide will deepen your understanding of solving quadratic equations and interpreting their solutions.

Deciphering the Equation: An Introduction

The given equation

$$
(x + 7)^2 = 36
$$

is a quadratic in disguise, involving a binomial squared. The goal is to find all real values of x that satisfy this equation. The structure suggests that the key operation is taking the square root of both sides, but with caution: since squaring a number always yields a non-negative result, the solutions must account for both positive and negative roots.

Understanding the Core Concepts

Before diving into solution steps, it’s essential to review some fundamental concepts:

1. Square Roots and Their Properties

- The square root of a non-negative real number a, denoted $\sqrt{a}$, refers to the non-negative number b such that $b^2 = a$.

- For any real number $a \geq 0$, the equation $x^2 = a$ has two solutions: $x = \sqrt{a}$ and $x = -\sqrt{a}$.

2. Solving Quadratic Equations

- Equations involving squared variables can often be solved by taking square roots, factoring, or applying the quadratic formula.

- In this case, because the equation is already expressed as a perfect square, the primary method involves isolating the squared term and taking roots.

3. Domain Considerations

- Since the right side is 36 (a positive number), the equation has real solutions. If the right side were negative, there would be no real solutions.

Step-by-Step Solution Process

Let's now systematically solve the equation:

$$
(x + 7)^2 = 36
$$

Step 1: Recognize the structure

The expression $(x + 7)^2$ indicates a perfect square binomial. The goal is to solve for x.

Step 2: Take the square root of both sides

Applying the square root to both sides:

$$
\sqrt{(x + 7)^2} = \pm \sqrt{36}
$$

which simplifies to:

$$
|x + 7| = \pm 6
$$

But, more accurately, since the square root of a square yields the absolute value:

$$
|x + 7| = 6
$$

Note: The $\pm$ sign appears when considering the square root of the right side. The key is to recognize that the square root yields the positive root, but because the original equation involves a square, solutions include both positive and negative roots.

Step 3: Break into two cases

The absolute value equation yields two solutions:

1. $x + 7 = 6$

2. $x + 7 = -6$

Step 4: Solve each case

- For $x + 7 = 6$:

$$
x = 6 - 7 = -1
$$

- For $x + 7 = -6$:

$$
x = -6 - 7 = -13
$$

Summary of Solutions

The solutions to the equation $(x + 7)^2 = 36$ are:

$$
x = -1 \quad \text{and} \quad x = -13
$$

Both satisfy the original equation, as demonstrated below:

- For $x = -1$:

$$
(x + 7)^2 = (-1 + 7)^2 = (6)^2 = 36
$$

- For $x = -13$:

$$
(x + 7)^2 = (-13 + 7)^2 = (-6)^2 = 36
$$

Additional Insights and Related Concepts

This problem exemplifies key algebraic techniques and principles that extend to more complex equations. Here are some additional insights:

1. Equations Involving Squares

- Always consider taking the square root of both sides, remembering to include both positive and negative roots.

- Use absolute value to represent the solution compactly when dealing with squares.

2. Quadratic Equations and Their Roots

- Equations in the form $ax^2 + bx + c = 0$ can be solved via factoring, completing the square, or the quadratic formula.

- The quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ provides a systematic way to find solutions, especially when factoring is difficult.

3. Graphical Interpretation

- The graph of $y = (x + 7)^2$ is a parabola opening upwards with its vertex at -7.

- The horizontal line $y = 36$ intersects this parabola at two points, corresponding to the solutions $x = -1$ and $x = -13$.

- Visualizing solutions helps reinforce understanding and confirms the algebraic findings.

Common Pitfalls and Tips for Solving Similar Problems

- Remember to consider both positive and negative roots when taking square roots of both sides.

- Check solutions in the original equation to avoid extraneous solutions, especially when dealing with equations involving radicals.

- Be cautious with absolute value equations, which often split into multiple cases.

- Recognize perfect squares and their properties to simplify equations efficiently.

- Practice factoring and quadratic formula applications, as many equations can be approached through multiple methods.

Conclusion: Mastering the Art of Algebraic Solutions

The problem Given $(x + 7)^2 = 36$, select the values of x is a classic illustration of fundamental algebraic techniques. By understanding the properties of squares, absolute values, and roots, we've identified that $x = -1$ and $x = -13$ are the solutions. This process underscores the importance of methodical problem-solving, critical thinking, and conceptual understanding in mathematics.

Whether you're tackling similar quadratic equations or exploring more advanced algebraic concepts, mastering these foundational techniques ensures confidence and accuracy in your mathematical endeavors. Remember, every complex problem often simplifies to a series of logical steps—approach them patiently, and the solutions will unfold clearly.

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