One Subtracted From The Result Of Tripling X And Is Equal To Two Times The Difference Of X And 4. Find

One Subtracted From The Result Of Tripling X And Is Equal To Two Times The Difference Of X And 4. Find is a classic algebraic problem that challenges students to translate words into mathematical equations and then solve for the variable. Such problems are fundamental in developing critical thinking and problem-solving skills, as well as understanding how to manipulate algebraic expressions effectively. In this article, we will explore how to interpret this problem, formulate the corresponding algebraic equation, solve for the variable X, and understand the steps involved in arriving at the solution. Whether you're a student preparing for exams or someone interested in sharpening your algebra skills, this comprehensive guide will walk you through the process step by step.

Understanding the Problem Statement

Before jumping into calculations, it is essential to break down the problem statement into manageable parts and understand what each phrase signifies algebraically.

Breaking Down the Sentence

The problem states:
"One subtracted from the result of tripling X and is equal to two times the difference of X and 4."

Let's analyze this sentence piece by piece:

- "Tripling X": This refers to multiplying X by 3, which is expressed as 3X.
- "The result of tripling X": This is simply 3X.
- "One subtracted from the result of tripling X": This means 3X minus 1, written as (3X - 1).
- "Is equal to": Indicates an equality, represented by '='.
- "Two times the difference of X and 4": The difference of X and 4 is (X - 4), and two times this difference is 2(X - 4).

Putting it together, the sentence describes an equation:

(3X - 1) = 2(X - 4)

Formulating the Algebraic Equation

Having interpreted the language, the next step is to write the algebraic equation explicitly:

```plaintext
(3X - 1) = 2(X - 4)
```

This equation contains a single variable, X, and can be solved using standard algebraic techniques.

Solving the Equation Step by Step

Let's walk through the process of solving for X systematically.

Step 1: Expand the Equation

Distribute the 2 on the right side:

```plaintext
3X - 1 = 2 X - 2 4
3X - 1 = 2X - 8
```

Step 2: Rearrange to Isolate X

To solve for X, gather all terms containing X on one side and constants on the other:

Subtract 2X from both sides:

```plaintext
3X - 2X - 1 = -8
X - 1 = -8
```

Add 1 to both sides:

```plaintext
X = -8 + 1
X = -7
```

Solution: X = -7

Verifying the Solution

It's important to verify the solution by substituting X = -7 back into the original equation.

Original equation:

```plaintext
(3X - 1) = 2(X - 4)
```

Substitute X = -7:

```plaintext
3(-7) - 1 = 2(-7 - 4)
-21 - 1 = 2(-11)
-22 = -22
```

Since both sides are equal, the solution X = -7 is correct.

Real-World Applications of Algebraic Word Problems

Understanding how to convert word problems into algebraic equations is valuable beyond academic exercises. These skills are applicable in various fields:

Financial Planning and Budgeting

- Calculating investments, loans, and interest rates often involves setting up equations based on given conditions.

Engineering and Physics

- Problems involving forces, motion, and energy frequently require translating real-world descriptions into mathematical models.

Business and Economics

- Profit maximization, cost analysis, and supply-demand modeling depend on algebraic problem-solving.

Tips for Solving Algebra Word Problems

To efficiently tackle similar problems, consider the following strategies:

1. Read Carefully

- Pay attention to every detail in the problem and identify keywords like "total," "difference," "product," and "quotient."

2. Translate Words into Equations

- Break down sentences into mathematical expressions systematically.

3. Simplify Step by Step

- Expand, combine like terms, and isolate variables methodically.

4. Verify Your Solution

- Always substitute the solution back into the original problem to confirm correctness.

5. Practice Regularly

- Consistent practice improves understanding and problem-solving speed.

Conclusion

The problem "One subtracted from the result of tripling X and is equal to two times the difference of X and 4" exemplifies the importance of translating verbal descriptions into algebraic equations. By carefully analyzing the

language, formulating the equation, and following systematic steps to solve, you can confidently find the value of X — in this case, X = -7. Mastery of such problems enhances your overall mathematical reasoning and prepares you for more complex algebraic challenges. Remember, practice makes perfect, so keep working through similar word problems to strengthen your skills and understanding of algebra.

If you want to learn more about algebraic equations, solving methods, or practice problems, explore additional resources or consult your mathematics instructor. Whether for academic success or practical application, understanding how to approach word problems like this is an essential skill in the toolkit of mathematics.

Frequently Asked Questions

What is the algebraic expression for 'one subtracted from the result of tripling x'?

The expression is 3x - 1.

How do you set up the equation based on the phrase 'is equal to two times the difference of x and 4'?

The equation is 3x - 1 = 2(x - 4).

What is the first step to solve the equation 3x - 1 = 2(x - 4)?

Distribute the 2 on the right side to get 3x - 1 = 2x - 8.

How do you isolate x in the equation 3x - 1 = 2x - 8?

Subtract 2x from both sides to get x - 1 = -8, then add 1 to both sides to find x = -7.

What is the solution for x in the given problem?

The solution is x = -7.

How can you verify the solution x = -7 in the original statement?

Substitute x = -7 into the original expressions: 3(-7) - 1 = -21 - 1 = -22, and 2(-7 - 4) = 2(-11) = -22. Since both sides are equal, the solution is

verified.

What does this problem demonstrate about solving algebraic equations?

It demonstrates the importance of translating words into equations, distributing, and solving step-by-step to find the value of the variable.

Can this type of problem be solved using graphing methods?

Yes, by graphing the equations y = 3x - 1 and y = 2(x - 4), their intersection point gives the solution x = -7.

Additional Resources

Mathematical Problem Solving: An In-Depth Analysis of the Equation "One Subtracted From The Result Of Tripling X And Is Equal To Two Times The Difference Of X And 4"

When encountering complex algebraic expressions, the key to unlocking their secrets lies in carefully dissecting each component. Today, we'll delve into a challenging yet intriguing problem that exemplifies the beauty of algebra:

"One subtracted from the result of tripling X and is equal to two times the difference of X and 4."

This phrase, rich in mathematical terminology, calls for a systematic approach to translate it into an equation, analyze its structure, and ultimately solve for the variable X. Think of this process as akin to analyzing a sophisticated gadget—every part has a purpose, and understanding each component leads to mastering the whole.

Understanding the Problem: Breaking Down the Statement

Before jumping into calculations, it's essential to interpret the problem accurately. The phrase can seem convoluted, but with careful parsing, it reveals a clear mathematical structure.

Original Statement:

"One subtracted from the result of tripling X and is equal to two times the difference of X and 4."

Step-by-step breakdown:

1. Identify the key actions and quantities:

- Tripling X indicates multiplying X by 3, i.e., 3X.
- Result of tripling X is simply 3X.
- One subtracted from the result of tripling X suggests (3X) - 1.
- Difference of X and 4 translates to (X - 4).
- Two times the difference of X and 4 becomes 2(X - 4).

2. Translate into an algebraic equation:

The phrase "One subtracted from the result of tripling X" corresponds to (3X) - 1.

This is equal to the right side: 2(X - 4).

Thus, the algebraic equation is:

$$
(3X) - 1 = 2(X - 4)
$$

Formulating the Equation: From Words to Symbols

The core step in solving any algebraic problem is translating the verbal description into a precise mathematical expression.

The Equation:

$$
3X - 1 = 2(X - 4)
$$

This concise representation encapsulates the entire problem, serving as the foundation for solution steps.

Step-by-Step Solution Process

Having established the equation, let's proceed with solving for X meticulously.

Step 1: Expand the right side

Apply the distributive property:

$$
3X - 1 = 2X - 8
$$

Step 2: Isolate the variable terms

Subtract 2X from both sides to gather all X terms on one side:

$$
3X - 2X - 1 = -8
$$

Simplify:

$$
X - 1 = -8
$$

Step 3: Solve for X

Add 1 to both sides:

$$
X = -8 + 1
$$

$$
X = -7
$$

Solution:

$$
\boxed{X = -7}
$$

Verification: Confirming the Solution

It’s always prudent to verify the solution by substituting X = -7 back into the original statement.

Original verbal statement:

"One subtracted from the result of tripling X and is equal to two times the difference of X and 4."

Substitute $X = -7$:

- Tripling X: $3 \times (-7) = -21$
- Result of tripling X minus 1: $-21 - 1 = -22$
- Difference of X and 4: $-7 - 4 = -11$
- Two times this difference: $2 \times (-11) = -22$

Comparison:

Left side: -22

Right side: -22

Since both sides are equal, the solution $X = -7$ is verified.

The Significance of the Solution and Broader Implications

Understanding this problem’s solution offers more than just the numerical answer; it provides insight into fundamental algebraic principles and problem-solving strategies.

Key Takeaways:

- Translation Skills: Converting verbal descriptions into equations is a critical skill, especially in real-world applications like physics, finance, and engineering.

- Stepwise Approach: Breaking down the problem into manageable parts ensures clarity and reduces errors.

- Verification: Always confirm solutions to avoid pitfalls of algebraic miscalculations.

Applications in Real Life:

- Financial Modeling: Calculating profits that involve multiple steps and deductions.
- Physics: Converting word problems involving distances, velocities, and forces into equations.
- Engineering: Designing systems where multiple parameters interact linearly

or non-linearly.

Advanced Considerations and Variations

While this problem features a straightforward linear equation, similar structures can involve quadratic or higher-degree equations, inequalities, or systems of equations. For example:

- Quadratic Variations: Problems where the verbal description leads to an X^2 term, requiring quadratic formula or factoring methods.
- Inequalities: Scenarios where the relation is not equal but greater than or less than, adding a layer of complexity.
- Systems of Equations: Multiple conditions involving different variables necessitating substitution or elimination methods.

Conclusion: Mastering Algebraic Word Problems

This detailed exploration demonstrates how a seemingly complex verbal statement can be systematically unraveled into a solvable algebraic equation. Through careful interpretation, step-by-step algebraic manipulation, and verification, solving such problems becomes an approachable and even enjoyable process.

By developing these skills, learners can confidently tackle a wide array of mathematical challenges—from academic exercises to practical real-world problems. Remember, the key is patience, clarity, and methodical analysis.

Final note: Always revisit your solutions, and don’t hesitate to double-check your work. The journey from words to equations is a fundamental skill—one that empowers you to decode and solve the mathematical language of the world.

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