

(1 Point) Let $F(x) = 4x + 6x + 5$. Find X If $F(x) = 2$. $X =$

(1 Point) Let $F(x) = 4x + 6x + 5$. Find X If $F(x) = 2$. $X =$ is a typical algebraic problem that tests your understanding of linear equations and how to manipulate expressions to find unknown variables. This problem is simple yet fundamental in algebra, and mastering it provides a strong foundation for more complex mathematical concepts. In this article, we will explore how to approach such problems step-by-step, understand the underlying principles, and apply relevant techniques to find the value of X accurately.

Understanding the Function $F(x) = 4x + 6x + 5$

Before jumping into solving for X, it's essential to understand the function given and how to interpret it.

Breaking Down the Function

The function $F(x)$ is expressed as the sum of two terms involving X:

- $4x$
- $6x$
- plus a constant 5

Combining like terms simplifies the function:

- $4x + 6x = 10x$

Thus, the function can be rewritten as:

- $F(x) = 10x + 5$

This simplification is crucial because it makes solving for X more straightforward.

Why Simplify the Function?

Simplifying the function reduces complexity, making it easier to isolate X. Instead of dealing with multiple similar terms, you now have a single term involving X, which simplifies the algebraic process.

Solving the Equation $F(x) = 2$

Given that $F(x) = 10x + 5$, and we're told $F(x) = 2$, we can set up the equation:

- $10x + 5 = 2$

This is a basic linear equation in one variable.

Step-by-Step Solution

Let's walk through the solution process:

1. Subtract 5 from both sides to isolate the term with X:

$$\circ 10x + 5 - 5 = 2 - 5$$

$$\circ 10x = -3$$

2. Divide both sides by 10 to solve for X:

$$\circ x = -3 / 10$$

Thus, the value of X is $-3/10$, or -0.3 in decimal form.

Interpreting the Solution

The value of X, $-3/10$, indicates the specific input that makes the function's output equal to 2.

Verification

Always verify your solution by substituting back into the original function:

$$\text{- } F(x) = 10x + 5$$

$$\text{- Substitute } x = -3/10:$$

$$\text{- } F(-3/10) = 10(-3/10) + 5 = -3 + 5 = 2$$

Since the result matches the given $F(x)$ value, the solution is correct.

Key Concepts Covered

This problem involves several fundamental algebraic principles:

- Combining like terms
- Setting up equations based on functions
- Isolating variables
- Performing inverse operations (addition/subtraction and multiplication/division)

- Verifying solutions by substitution

Common Mistakes to Avoid

When solving similar problems, watch out for:

- Incorrectly combining like terms—always double-check your addition or subtraction.
- Forgetting to perform the same operation on both sides of the equation.
- Dividing by zero, which occurs if the coefficient of X is zero (not the case here, but a common mistake in more complex problems).
- Misinterpreting the function or the problem statement.

Additional Practice Problems

To strengthen your understanding, try solving similar problems:

1. Given $F(x) = 3x + 7$, find x if $F(x) = 22$.
2. Given $F(x) = 5x - 4$, find x if $F(x) = 11$.
3. Given $F(x) = 2x + 3x + 4$, find x if $F(x) = 20$.

Solutions involve similar steps:

- Simplify the function
- Set the function equal to the given value
- Solve for x using inverse operations

Real-World Applications of Solving Linear Equations

Understanding how to solve for variables like X in linear functions is essential beyond pure mathematics. It applies in various fields:

- Finance: Calculating interest or loan payments
- Physics: Determining unknown quantities like speed or distance
- Engineering: Designing systems with specific parameters
- Economics: Modeling demand or supply functions

Mastering these skills allows you to analyze and interpret real-world data effectively.

Conclusion

The problem, **(1 Point) Let $F(x) = 4x + 6x + 5$. Find X If $F(x) = 2$. $X =$** , demonstrates a typical approach to solving linear equations. By simplifying the function, setting up the equation, and performing inverse operations, you can find the value of X efficiently. Remember to verify your solution to ensure accuracy. This process is fundamental in algebra and forms the basis for understanding more complex mathematical concepts and real-world problem-solving.

With consistent practice, solving for unknown variables becomes second nature, enabling you to tackle a broad range of mathematical and practical challenges confidently.

Frequently Asked Questions

Given the function $F(x) = 4x + 6x + 5$, what is the value of X when $F(x) = 2$?

First, simplify $F(x)$: $4x + 6x + 5 = 10x + 5$. Set equal to 2: $10x + 5 = 2$. Subtract 5: $10x = -3$. Divide both sides by 10: $X = -3/10$.

How do you solve for X in the equation $F(x) = 10x + 5$ when $F(x)$ equals 2?

Set $10x + 5 = 2$, then subtract 5 from both sides to get $10x = -3$. Divide both sides by 10, resulting in $X = -3/10$.

What is the simplified form of the function $F(x) = 4x + 6x + 5$?

Combine like terms: $4x + 6x = 10x$. So, $F(x) = 10x + 5$.

If $F(x) = 10x + 5$ and $F(x) = 2$, how can we find the value of X ?

Set $10x + 5 = 2$, then solve for X by subtracting 5 and dividing by 10: $X = -3/10$.

What is the solution for X in the equation $10x + 5 = 2$?

Subtract 5 from both sides: $10x = -3$. Then divide both sides by 10: $X = -3/10$.

Is the value of X in the equation $F(x) = 4x + 6x + 5$ when $F(x)$ equals 2 positive or negative?

The value of X is negative, specifically $X = -3/10$.

Why do we combine $4x$ and $6x$ in the function $F(x)$?

Because they are like terms; combining them simplifies the function to $F(x) = 10x + 5$, making it easier to solve for X .

Additional Resources

Understanding the Problem: Solving for X in the Equation $F(x) = 2$

When we encounter a problem that involves a function like $F(x) = 4x + 6x + 5$, and are asked to find the value of x given a specific output (in this case, $F(x) = 2$), it's crucial to approach the problem systematically. This involves understanding the function's composition, simplifying the expression, and then solving the resulting algebraic equation.

This comprehensive review aims to guide you through each step of this process, providing clarity and depth on the mathematical concepts involved, potential pitfalls, and strategies for solving similar problems efficiently.

Deciphering the Function: What Does $F(x)$ Represent?

Before attempting to find the value of x , it's essential to understand what the function $F(x)$ represents and how it operates.

Function Definition and Components

- The function in question is $F(x) = 4x + 6x + 5$.
- It is a linear function, as the highest degree of x is 1.
- The function involves two terms with x , which are straightforward to combine.

Importance of Correct Interpretation

- Misinterpreting the function can lead to incorrect solutions.
- Recognizing that the function has two similar terms ($4x$ and $6x$) helps in simplifying the expression effectively.

Step-by-Step Simplification of the Function

The first practical step in solving for x , given $F(x) = 2$, is to simplify the function expression.

Combining Like Terms

- The terms $4x$ and $6x$ are like terms because they both involve x .
- Adding these gives $4x + 6x = 10x$.

Simplified Function Form

- After combining, the function simplifies to:

$$F(x) = 10x + 5$$

This simplified form is easier to work with when solving for x.

Setting Up the Equation: $F(x) = 2$

Now, with the simplified function, the problem becomes:

$$10x + 5 = 2$$

This is a straightforward linear equation that can be solved systematically.

Key Points in Equation Setup

- Ensure the equation is correctly written and all terms are on the appropriate sides.
- Check for any potential errors in the initial problem statement or interpretation.

Solving the Equation for X

Let's now focus on solving $10x + 5 = 2$ step by step.

Isolate the Variable Term

- Subtract 5 from both sides to move constants to one side:

$$10x + 5 - 5 = 2 - 5$$

Which simplifies to:

$$10x = -3$$

Divide to Find X

- Divide both sides by 10 to isolate x:

$$x = (-3) / 10$$

Final Solution

- Therefore,

$$x = -0.3$$

This is the value of x that satisfies the original equation $F(x) = 2$.

Verification and Critical Analysis

Verifying the solution is an essential step in any algebraic problem to ensure accuracy.

Substitute Back into the Function

- Plug $x = -0.3$ into the simplified $F(x)$:

$$F(-0.3) = 10(-0.3) + 5 = -3 + 5 = 2$$

- The result matches the given output, confirming the correctness of the solution.

Understanding the Significance of the Result

- The negative value of x indicates that to achieve an output of 2, the input must be negative.
- The linear nature of the function means the graph is a straight line, and the solution corresponds to a point on this line.

Broader Mathematical Context and Concepts

This problem touches on several fundamental algebraic concepts and principles. Understanding these provides deeper insights into solving similar problems.

Linear Functions and Their Properties

- Linear functions are functions of the form $F(x) = mx + b$, where m is the slope and b is the y-intercept.
- The slope (here 10) indicates the rate of change of the function.
- The y-intercept (here 5) is the value of $F(x)$ when $x = 0$.

Simplification of Expressions

- Combining like terms is a foundational skill in algebra.
- Proper simplification reduces the chance of errors and makes solving equations more manageable.

Solving Linear Equations

- Involves isolating the variable term through inverse operations.
- It is essential to maintain balance by performing the same operation on both sides of the equation.

Verification of Solutions

- Substituting the solution back into the original or simplified function confirms accuracy.
- Helps identify potential mistakes or misinterpretations.

Common Mistakes and How to Avoid Them

Understanding potential pitfalls enhances problem-solving skills.

Mistake 1: Not Simplifying Properly

- Failing to combine like terms accurately can lead to incorrect equations.
- Always double-check the algebraic simplification.

Mistake 2: Arithmetic Errors

- Errors in subtraction, addition, or division can compromise the solution.
- Use a calculator for complex calculations or double-check each step.

Mistake 3: Misreading the Function

- Confusing the function components or misinterpreting the problem statement.
- Read the problem carefully, ensuring the function is understood correctly.

Mistake 4: Forgetting to Verify

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

Extending the Problem: Variations and Generalizations

Once comfortable with the basic problem, exploring variations can deepen understanding.

Changing the Function

- For example, consider $F(x) = 4x + 6x + c$, where c is a constant.
- How does this affect the solution process?

Different Values of $F(x)$

- What if $F(x) = k$, where k is any real number?
- How does the solution change with different values?

Higher-Degree Functions

- Moving beyond linear functions to quadratic or cubic forms introduces new solving techniques, such as factoring or quadratic formulas.

Practical Applications of Solving for X

Understanding how to manipulate and solve functions has numerous real-world applications:

- Engineering: Calculating specific points on a line or curve based on desired outputs.
- Economics: Determining input levels that produce certain profit or cost figures.
- Science: Modeling relationships between variables and solving for unknowns.
- Data Analysis: Fitting linear models to data and predicting outcomes.

Conclusion: Mastery Through Practice and Understanding

The problem "Let $F(x) = 4x + 6x + 5$. Find X if $F(x) = 2$ " exemplifies fundamental algebra skills: simplification, solving linear equations, and verification.

By systematically approaching the problem:

- Simplify the function to its core linear form.
- Set up the equation correctly.
- Solve step-by-step, respecting algebraic rules.

- Verify the solution through substitution.

Mastering these steps enables you to tackle more complex functions and equations confidently. Remember, practice is key—working through various problems enhances intuition and proficiency.

In the broader scope, understanding the structure and properties of linear functions allows you to interpret graphs, analyze data relationships, and develop problem-solving strategies applicable in diverse fields.

Always approach such problems with clarity, patience, and attention to detail, which are the hallmarks of strong mathematical reasoning.

1 Point Let $F(x) = 4x^6 - 5$ Find x If $F(x) = 2$

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