A Function Is Defined By Fx) = 5(2-x). What Is F(-1)?

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Understanding the concept of functions is fundamental in mathematics, especially in algebra. When a function is given in a specific form, such as $F(x) = 5(2 - x)$, it becomes essential to interpret and evaluate the function at particular values of x. In this case, the question "What is $F(-1)$?" prompts us to substitute $x = -1$ into the function and compute its value. This process, known as function evaluation, forms the basis of many mathematical operations and problem-solving strategies.

Understanding the Function $F(x) = 5(2 - x)$

What Does the Function Represent?

The given function $F(x) = 5(2 - x)$ is a linear function because it involves a single variable x multiplied by a constant and added to a constant term. The function describes a relationship where, for each input x, the output $F(x)$ is calculated by multiplying the quantity $(2 - x)$ by 5.

This type of function is common in algebra and can be visualized as a straight line when graphed on the coordinate plane. The structure of the function indicates that:

- The value of $F(x)$ depends linearly on x.
- As x increases or decreases, $F(x)$ changes proportionally, with a slope related to the coefficient 5.

Breaking Down the Function Components

The function $F(x) = 5(2 - x)$ can be viewed in parts:

- The constant 2 inside the parentheses shifts the relationship along the x-axis.
- The term $-x$ indicates that the function decreases as x increases.
- The coefficient 5 outside the parentheses scales the entire expression.

This understanding helps us interpret how the function behaves and how to evaluate it at specific points.

Evaluating $F(-1)$: Step-by-Step Process

Step 1: Identify the Input Value

The problem asks for the value of the function at $x = -1$. This means we need to substitute -1 into the function.

Step 2: Substitute -1 into the Function

Replace every x in the function with -1:

$$
F(-1) = 5(2 - (-1))
$$

Step 3: Simplify the Expression Inside the Parentheses

Recall that subtracting a negative number is equivalent to addition:

$$
2 - (-1) = 2 + 1 = 3
$$

Therefore, the expression becomes:

$$
F(-1) = 5 \times 3
$$

Step 4: Perform the Multiplication

Multiply 5 by 3:

$$
F(-1) = 15
$$

Conclusion of Evaluation

The value of the function at $x = -1$ is:

$$
\boxed{F(-1) = 15}
$$

This straightforward process exemplifies how substitution and basic arithmetic are used to evaluate functions at specific points.

Deeper Insights into the Function $F(x) = 5(2 - x)$

Graphical Representation

Understanding how the function looks graphically can provide additional insights.

- The function can be rewritten in slope-intercept form:

$$
F(x) = 5(2 - x) = 10 - 5x
$$

- It is a linear function with:

- Slope $m = -5$
- Y-intercept $b = 10$

- The graph is a straight line crossing the y-axis at $(0, 10)$.

- The negative slope indicates that the line descends as x increases.

Properties of the Function

Some key properties include:

- Domain: All real numbers $\mathbb{R}$, since there are no restrictions on x.
- Range: All real numbers $\mathbb{R}$, because as x varies, $F(x)$ can take any real value.
- Intercepts:
- Y-intercept at $F(0) = 10$.
- X-intercept where $F(x) = 0$:

\[
0 = 10 - 5x \Rightarrow 5x = 10 \Rightarrow x = 2
\]

So, the point \((2, 0) \) is on the graph.

Applications and Importance of Evaluating Functions

Real-World Contexts

Functions like \(F(x) = 5(2 - x) \) are used in various fields:

- Economics: To model revenue, costs, or profit depending on certain variables.
- Physics: To describe relationships involving distance, velocity, or other quantities.
- Engineering: For system behaviors that change linearly with input parameters.

Mathematical Foundations

Evaluating functions at specific points is a foundational skill in mathematics, enabling:

- Graph plotting
- Function transformations
- Solving equations
- Understanding relationships between variables

Summary and Final Thoughts

Evaluating the function \(F(x) = 5(2 - x) \) at \(x = -1 \) involves substituting \(-1 \) into the

expression, simplifying, and performing the arithmetic operation. The process reveals that \(F(-1) = 15 \). Understanding how to evaluate functions precisely and interpret their properties is essential in mathematics and its applications across various disciplines. It provides a basis for more advanced concepts such as inverse functions, composite functions, and calculus, where evaluation at specific points often leads to deeper insights into the behavior of functions. Mastery of these skills enables students and professionals alike to analyze real-world problems and develop solutions effectively.

Frequently Asked Questions

What is the value of F(-1) for the function F(x) = 5(2 - x)?

F(-1) = 5(2 - (-1)) = 5(2 + 1) = 5(3) = 15.

How do you evaluate F(x) = 5(2 - x) at x = -1?

Substitute x = -1 into the function: F(-1) = 5(2 - (-1)) = 5(2 + 1) = 15.

What is the general process to find F(a) for a function like F(x) = 5(2 - x)?

Replace x with a in the function and simplify: F(a) = 5(2 - a).

Is the function F(x) = 5(2 - x) linear?

Yes, F(x) = 5(2 - x) simplifies to F(x) = 10 - 5x, which is linear.

What is the slope of the function F(x) = 5(2 - x)?

The slope is -5, since the function simplifies to F(x) = 10 - 5x.

How does changing x affect the value of F(x) in the function F(x) = 5(2 - x)?

As x increases, F(x) decreases linearly because of the negative coefficient of x.

Can you find F(0) for the function F(x) = 5(2 - x)?

Yes. F(0) = 5(2 - 0) = 5(2) = 10.

What is the y-intercept of the function F(x) = 5(2 - x)?

The y-intercept occurs at x=0, which gives F(0) = 10.

How do you interpret the value F(-1) = 15 in the context of the function?

It means that when x = -1, the function's output is 15, representing a specific point on the graph.

Is the function F(x) = 5(2 - x) increasing or decreasing?

The function is decreasing because the coefficient of x is negative (-5).

Additional Resources

A Function Is Defined By F(x) = 5(2 - x). What Is F(-1)? – this question exemplifies fundamental concepts in algebra and functions, often introduced in early mathematics education but also crucial for advanced problem-solving. Understanding how to evaluate a function at a specific point allows us to interpret the behavior of functions, analyze their properties, and apply this knowledge to real-world scenarios. In this guide, we will explore the definition of the function, the step-by-step process to evaluate it at a given input, and provide detailed insights into the underlying concepts involved.

Understanding the Function F(x) = 5(2 - x)

What Is a Function?

Before delving into evaluation, it’s essential to clarify what a function is. A function is a rule that assigns each input from a set (called the domain) to exactly one output in another set (called the codomain). In this case, the function is explicitly defined as:

F(x) = 5(2 - x)

This notation indicates that for any real number x, the function produces a corresponding value determined by multiplying 5 by the quantity (2 - x).

Breaking Down the Function Components

- Linear Expression: The expression inside the parentheses, (2 - x), is linear, meaning its graph is a straight line.
- Scaling Factor: The 5 outside the parentheses acts as a scaling factor, stretching or compressing the graph vertically.
- Overall Behavior: The function combines these aspects to produce a straight-line graph with a specific slope and y-intercept.

Step-by-Step Evaluation of F(-1)

1. Recognize the Input Value

We are asked to find F(-1), which means substituting x = -1 into the function.

2. Substitute x with -1 in the function

Start by replacing every occurrence of x with -1:

F(-1) = 5(2 - (-1))

3. Simplify the expression inside the parentheses

Recall that subtracting a negative number is equivalent to addition:

2 - (-1) = 2 + 1 = 3

4. Perform the multiplication

Now, multiply 5 by the simplified value:

F(-1) = 5 3 = 15

Answer:

F(-1) = 15

Deep Dive into the Evaluation Process

While the calculation above seems straightforward, it’s important to understand the principles and common pitfalls involved.

Understanding Substitution

- When substituting a value into a function, always replace the variable with the specific value.
- Be cautious with negative signs; double-check that the substitution is correctly placed within

parentheses if necessary.

Simplification Rules

- Use order of operations (PEMDAS/BODMAS): Parentheses, Exponents, Multiplication and Division, Addition and Subtraction.
- Simplify inside parentheses first before applying multiplication.

Visualizing the Function

Plotting the function or analyzing its graph can enhance understanding:

- Y-intercept: When x = 0, F(0) = 5(2 - 0) = 5 2 = 10
- X-intercept: Set F(x) = 0 and solve for x:

0 = 5(2 - x)

Divide both sides by 5:

0 = 2 - x

x = 2

- The graph crosses the x-axis at (2, 0) and y-axis at (0, 10).

Understanding these points helps contextualize the value of F(-1).

Broader Context and Applications

Why Evaluate Functions at Specific Points?

- Predict behavior: Find specific outputs to understand how the function behaves.
- Solve real-world problems: Many applications require evaluating functions at given inputs, such as calculating costs, distances, or other measurable quantities.
- Graphing and analysis: Determine key points for sketching the graph.

Example Applications

- Physics: Calculating position or velocity at a certain time.
- Economics: Determining total cost given a fixed rate and quantity.
- Engineering: Analyzing system responses at specific input values.

Common Mistakes to Avoid

- Incorrect substitution: Forgetting parentheses around negative numbers.
- Order of operations: Not following the correct sequence—performing multiplications before simplifying inside parentheses.
- Ignoring the domain: Ensuring the input value is within the domain of the function if specified.

Additional Practice Problems

To reinforce understanding, consider the following:

1. Find $F(3)$ if $F(x) = 5(2 - x)$.
2. Evaluate $F(0)$.
3. Determine the x-value where $F(x) = 0$.

Summary

In this comprehensive guide, we've examined A function defined by F(x) = 5(2 - x), with a focus on evaluating it at a specific point, F(-1). The key steps involved substituting -1 for x, simplifying the algebraic expression, and performing the multiplication. The process illustrates fundamental algebraic principles and reinforces the importance of understanding how functions operate at specific inputs.

Final thoughts:

- Evaluating functions is a foundational skill in mathematics, essential for analyzing and interpreting data.
- Always verify your substitution and simplification steps to avoid common errors.
- Visualizing the function graph helps deepen understanding of its behavior across the domain.

By mastering these concepts, you build a strong foundation for more advanced topics in calculus, algebra, and applied mathematics.

Remember: A function is more than just an expression—it's a tool that models relationships and processes in the world around us.

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