Given That $G(x)= 2x^2 - 3x + 19$, Find Each Of The Following. A.) G(0) B.) G (-1) C.) G(3) D.)g(-x) E.)

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Understanding how to evaluate functions at specific points and manipulate their expressions is fundamental in algebra. The function $G(x) = 2x^2 - 3x + 19$ provides an excellent example of quadratic functions and the techniques used to find their values at given inputs. In this article, we will walk through each of the parts—calculating G(0), G(-1), G(3), and understanding g(-x)—step-by-step, providing clarity on how to work with functions effectively. Whether you're a student preparing for exams or someone interested in math concepts, this guide will enhance your understanding of function evaluation and algebraic manipulation.

Understanding the Given Function $G(x) = 2x^2 - 3x + 19$

Before diving into specific calculations, it’s crucial to grasp the structure of the function itself. G(x) is a quadratic function, characterized by the squared term $2x^2$, which indicates the parabola's opening direction and steepness.

Key features of G(x):
- Quadratic form: $G(x) = ax^2 + bx + c$, where $a=2$, $b=-3$, $c=19$.
- Parabola opening upwards because $a=2 > 0$.
- The y-intercept occurs when $x=0$: $G(0)=19$, which is the point where the parabola crosses the y-axis.

Now, let’s explore how to evaluate the function at specific points and manipulate its expressions.

Part A: Calculating G(0)

Step-by-step process:

1. Substitute $x=0$ into G(x):

$G(0) = 2(0)^2 - 3(0) + 19$

2. Simplify each term:

- 2(0)^2 = 20 = 0
- -3(0) = 0
- Constant term: 19

3. Combine the results:

G(0) = 0 + 0 + 19 = 19

Conclusion: When x=0, G(x) equals 19. This is consistent with the y-intercept of the parabola.

Part B: Calculating G(-1)

Step-by-step process:

1. Substitute x=-1 into G(x):

G(-1) = 2(-1)^2 - 3(-1) + 19

2. Evaluate each term:

- (-1)^2 = 1
- 2 1 = 2
- -3 -1 = +3
- Constant term: 19

3. Add the results:

G(-1) = 2 + 3 + 19 = 24

Conclusion: When x = -1, G(x) is 24.

Part C: Calculating G(3)

Step-by-step process:

1. Substitute x=3 into G(x):

G(3) = 2(3)^2 - 3(3) + 19

2. Evaluate each term:

- 3^2 = 9
- 2 9 = 18

- $-3 3 = -9$
- Constant term: 19

3. Combine:

$G(3) = 18 - 9 + 19 = (18 - 9) + 19 = 9 + 19 = 28$

Conclusion: At $x=3$, $G(x)$ equals 28.

Part D: Understanding and Calculating g(-x)

The notation $g(-x)$ indicates that the function g is applied to the negative of x. If $g(x)$ is the same as $G(x)$, then:

$g(-x) = G(-x)$

This is a reflection of the function across the y-axis, examining how the function behaves when x is replaced with -x.

Calculating $g(-x)$:

Since $G(x) = 2x^2 - 3x + 19$, then:

$g(-x) = 2(-x)^2 - 3(-x) + 19$

Step-by-step:

1. Evaluate each term:

- $(-x)^2 = x^2$
- $2 x^2 = 2x^2$
- $-3 (-x) = +3x$
- Constant term: 19

2. Rearranged expression:

$g(-x) = 2x^2 + 3x + 19$

Interpretation:

- The expression $g(-x)$ transforms the original $G(x)$ into a new function that depends on x, but with the linear term's sign flipped.
- This reflects the original parabola across the y-axis, altering the symmetry.

Example: For a specific value, say $x=2$,

$g(-2) = 2(2)^2 + 3(2) + 19 = 24 + 6 + 19 = 8 + 6 + 19 = 33$

Additional Insights and Applications

Understanding how to evaluate functions at specific points and manipulate their expressions is fundamental in algebra, calculus, and advanced mathematics. Here are some key takeaways:

- Function evaluation: Substituting specific x-values into the function allows you to find corresponding y-values, which can be useful in graphing and analyzing the function's behavior.
- Symmetry in functions: Replacing x with -x helps in understanding the symmetry of functions, especially in quadratic and even functions.
- Graphing insights: Calculated points like G(0), G(-1), and G(3) serve as key points to sketch the graph accurately.
- Transformations: The expression g(-x) illustrates the concept of reflection, a common transformation in graphing functions.

Summary of Calculations

Part	Calculation	Result
A	G(0)	19
B	G(-1)	24
C	G(3)	28
D	g(-x) = 2x^2 + 3x + 19	Expression derived

Additional Tip: When working with functions, always carefully substitute the value of x, simplify step by step, and understand how changes in x affect the output.

Conclusion

Evaluating functions like G(x) = 2x^2 - 3x + 19 at specific points is a fundamental skill in algebra that supports more advanced topics such as calculus, graphing, and function transformations. By mastering these techniques—substituting values, simplifying expressions, and understanding symmetry—you can analyze and interpret functions more effectively. Whether you're calculating G(0), G(-1), G(3), or exploring the reflection g(-x), these concepts form the backbone of many mathematical applications. Keep practicing these evaluations to build confidence and deepen your understanding of quadratic functions and their properties.

Remember: The key to success in math is practice, patience, and a solid grasp of foundational concepts.

Frequently Asked Questions

Given G(x) = 2x^2 - 3x + 19, what is G(0)?

G(0) = 2(0)^2 - 3(0) + 19 = 0 - 0 + 19 = 19.

Given G(x) = 2x^2 - 3x + 19, what is G(-1)?

G(-1) = 2(-1)^2 - 3(-1) + 19 = 2(1) + 3 + 19 = 2 + 3 + 19 = 24.

Given G(x) = 2x^2 - 3x + 19, what is G(3)?

G(3) = 2(3)^2 - 3(3) + 19 = 2(9) - 9 + 19 = 18 - 9 + 19 = 28.

Given G(x) = 2x^2 - 3x + 19, what is G(-x)?

G(-x) = 2(-x)^2 - 3(-x) + 19 = 2x^2 + 3x + 19.

How do you evaluate G(x) for a negative input, such as G(-x), given the function G(x) = 2x^2 - 3x + 19?

To evaluate G(-x), substitute -x into the function: G(-x) = 2(-x)^2 - 3(-x) + 19 = 2x^2 + 3x + 19, since (-x)^2 = x^2.

Additional Resources

Given That G(x)= 2x^2 - 3x + 19, Find Each Of The Following. A.) G(0) B.) G (-1) C.) G(3) D.)g(-x) E.)

Introduction

Mathematics is often regarded as the language of the universe, offering tools to describe, analyze, and interpret the world around us. Among these tools, quadratic functions hold a special place due to their widespread applications in physics, engineering, economics, and many other fields. Today, we delve into a specific quadratic function: \(G(x) = 2x^2 - 3x + 19 \). Our goal is to evaluate this function at specific points and transformations, providing a comprehensive understanding of how to approach such problems systematically. Whether you're a student brushing up on algebra or a curious reader exploring the fundamentals of functions, this article aims to clarify the process with clear explanations and methodical steps.

Understanding the Function \(G(x) = 2x^2 - 3x + 19 \)

Before tackling the specific questions, let's analyze the general structure of this quadratic function:

- Quadratic form: $G(x) = ax^2 + bx + c$, where $a = 2$, $b = -3$, and $c = 19$.
- Parabola orientation: Since $a = 2 > 0$, the parabola opens upwards, indicating the function has a minimum point.
- Vertex: The vertex of the parabola can be found using $x = -\frac{b}{2a}$. This point provides insight into the function's minimum value.
- Y-intercept: The value of $G(0)$ gives the y-intercept, which is the point where the graph crosses the y-axis.

By understanding these properties, we lay a solid foundation for calculating specific values as requested.

Part A: Calculating $G(0)$

Step-by-Step Process

1. Identify the value of x: For this part, $x = 0$.
2. Substitute $x = 0$ into the function:
$$
G(0) = 2(0)^2 - 3(0) + 19
$$
3. Simplify the expression:
$$
G(0) = 0 - 0 + 19 = 19
$$

Interpretation

The value of $G(0)$ is 19, which also represents the y-intercept of the parabola. Graphically, the parabola crosses the y-axis at the point (0, 19). This simple evaluation helps us understand where the graph begins on the y-axis and provides a baseline for analyzing the function's behavior.

Part B: Calculating $G(-1)$

Step-by-Step Process

1. Identify the value of x: $x = -1$.
2. Substitute into the function:
$$
G(-1) = 2(-1)^2 - 3(-1) + 19
$$
3. Simplify each term:
$$

$$
2(1) + 3 + 19
$$

4. Calculate the sum:

$$
2 + 3 + 19 = 24
$$

Interpretation

The value of $G(-1)$ is 24. This indicates that at $x = -1$, the parabola reaches a y-value of 24. It’s a point on the graph to help visualize the function's shape and how it behaves for negative inputs.

Part C: Calculating $G(3)$

Step-by-Step Process

1. Identify the value of x: $x = 3$.
2. Substitute into the function:

$$
G(3) = 2(3)^2 - 3(3) + 19
$$

3. Simplify each term:

$$
2(9) - 9 + 19
$$

4. Calculate the sum:

$$
18 - 9 + 19 = 28
$$

Interpretation

At $x = 3$, the function yields a value of 28. This point (3, 28) can be plotted on the parabola, helping to sketch or analyze the graph's symmetry and how the function behaves for positive inputs.

Part D: Finding $g(-x)$

Understanding the Concept

The expression $g(-x)$ represents a composite function, where the original function $g(x)$ is evaluated at $-x$. This transformation reflects the graph across the y-axis, providing insights into symmetry and the function's behavior under reflection.

Step-by-Step Process

1. Write the original function:
$$
G(x) = 2x^2 - 3x + 19
$$
2. Replace x with $-x$:
$$
G(-x) = 2(-x)^2 - 3(-x) + 19
$$
3. Simplify:
- Since $(-x)^2 = x^2$,
$$
G(-x) = 2x^2 + 3x + 19
$$

Implications

The transformed function:
$$
G(-x) = 2x^2 + 3x + 19
$$
differs from $G(x)$ in the sign of the linear term. While the quadratic term remains unchanged (due to the square), the linear term's sign change indicates reflection across the y-axis. This reflection can be visualized graphically, showing how the parabola's shape flips over the y-axis.

Additional Insights and Applications

Symmetry of the Parabola

Quadratic functions like $G(x)$ exhibit symmetry about their vertex. The transformation $G(-x)$ helps us understand this symmetry. In particular, the relationship between $G(x)$ and $G(-x)$ reveals whether the function is even, odd, or neither:

- Even function: $G(-x) = G(x)$. The graph is symmetric about the y-axis.
- Odd function: $G(-x) = -G(x)$. The graph is symmetric about the origin.
- Neither: The function does not possess symmetry in these forms.

In our case, since $G(-x) \neq G(x)$ and $G(-x) \neq -G(x)$, the function is neither even nor odd but has symmetry properties related to its vertex.

Vertex Calculation for Deeper Understanding

Knowing the vertex's coordinates can further enrich our understanding of the function's behavior:

$$
x_{vertex} = -\frac{b}{2a} = -\frac{-3}{2 \times 2} = \frac{3}{4}

\]

Substituting \(x = \frac{3}{4} \) into \(G(x) \) yields the minimum value of the function, which is valuable in optimization problems.

Practical Applications of Quadratic Functions

Quadratic functions are not just academic exercises; they have numerous practical applications:

- Physics: Describing projectile motion, such as the path of a thrown ball.
- Economics: Modeling profit and cost functions to find maximum profit or minimum cost.
- Engineering: Analyzing structural components that follow parabolic shapes.
- Biology: Modeling population growth with constraints.

Understanding how to evaluate quadratic functions at specific points and interpret their transformations is fundamental for applying these concepts across disciplines.

Conclusion

The evaluation of the quadratic function \(G(x) = 2x^2 - 3x + 19 \) at specific points and transformations offers a window into the function's structure and behavior. From calculating the y-intercept \(G(0) \) to understanding the reflection \(G(-x) \), each step deepens our grasp of quadratic functions' properties. These skills are essential for students, educators, and professionals who rely on algebraic analysis to model real-world phenomena. Mastery of such evaluations not only enhances mathematical proficiency but also paves the way for applying these principles in diverse scientific and practical contexts.

By systematically approaching each problem, analyzing the transformations, and interpreting the results, learners develop a robust understanding of quadratic functions' dynamics—an essential stepping stone in the broader landscape of mathematics and science.

Given That G X 2x 2 3x 19 Find Each Of The Following A G 0 B G 1 C G 3 D G X E

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