Inverse Function Worksheet

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Part 1: Building a Foundation

What is the notation used to represent the inverse of a function \(f(x) \)?

Hint: Think about the common notation used in mathematics for inverse functions.

- ◯ A) \(f^{-1}(x) \)
- ◯ B) \(\frac{1}{f(x)} \)
- ◯ C) \(f(x)^{-1} \)
- ◯ D) \(f^2(x) \)

Which of the following statements are true about inverse functions?

Hint: Consider the properties and definitions of inverse functions.

- ☐ A) An inverse function reverses the operation of the original function.
- ☐ B) The inverse of a function is always a function.
- ☐ C) \(f(f^{-1}(x)) = x \) for all \(x \) in the domain of \(f^{-1} \).
- ☐ D) The graph of an inverse function is a reflection over the line \(y = x \).

Explain why a function must be one-to-one to have an inverse.

Hint: Consider the definition of one-to-one functions and their implications for inverses.

List the steps involved in finding the inverse of a function.

Hint: Think about the algebraic manipulations needed to isolate the variable.

1. Step 1

2. Step 2

3. Step 3

Which test can be used to determine if a function is one-to-one?

Hint: Think about the graphical tests used in calculus.

- ◯ A) Vertical line test
- ◯ B) Horizontal line test
- ◯ C) Diagonal line test
- ◯ D) Symmetry test

Part 2: Comprehension and Application

If the function \(f(x) = 3x + 5 \), what is the first step in finding its inverse?

Hint: Consider how to manipulate the equation to isolate \(x \).

- ◯ A) Add 5 to both sides
- ◯ B) Subtract 5 from both sides
- ◯ C) Divide by 3
- ◯ D) Multiply by 3

Which of the following are true about the domain and range of a function and its inverse?

Hint: Think about how the domain and range relate to each other.

- ☐ A) The domain of the original function becomes the range of the inverse.
- ☐ B) The range of the original function becomes the domain of the inverse.
- ☐ C) They remain unchanged.
- ☐ D) They are unrelated.

Describe how the graph of a function and its inverse are related.

Hint: Consider the geometric relationship between the two graphs.

Given the function \(f(x) = 2x - 4 \), what is the inverse function \(f^{-1}(x) \)?

Hint: Think about how to manipulate the equation to find the inverse.

- ◯ A) \(f^{-1}(x) = \frac{x + 4}{2} \)
- ◯ B) \(f^{-1}(x) = \frac{x - 4}{2} \)
- ◯ C) \(f^{-1}(x) = 2x + 4 \)
- ◯ D) \(f^{-1}(x) = 2x - 4 \)

Find the inverse of the function \(f(x) = \frac{x - 1}{x + 1} \).

Hint: Consider how to manipulate the equation to isolate \(x \).

Part 3: Analysis, Evaluation, and Creation

Which of the following functions is not one-to-one and therefore does not have an inverse?

Hint: Consider the properties of the functions listed.

- ◯ A) \(f(x) = x^3 \)
- ◯ B) \(f(x) = \sqrt{x} \)

- ◯ C) \(f(x) = x^2 \)
- ◯ D) \(f(x) = \ln(x) \)

Analyzing the function \(f(x) = \frac{1}{x} \), which of the following statements are true?

Hint: Consider the properties of the function and its graph.

- ☐ A) The function is one-to-one.
- ☐ B) The function has an inverse.
- ☐ C) The function's graph is symmetric about the line \(y = x \).
- ☐ D) The function is not defined at \(x = 0 \).

Analyze the function \(f(x) = |x| \) and explain why it does not have an inverse.

Hint: Consider the definition of one-to-one functions.

If the function \(f(x) = 5x - 7 \) is modified to \(f(x) = 5x^2 - 7 \), what happens to its invertibility?

Hint: Consider how the modification affects the function's one-to-one property.

- ◯ A) It remains invertible.
- ◯ B) It becomes non-invertible.
- ◯ C) It becomes invertible only for positive \(x \).
- ◯ D) It becomes invertible only for negative \(x \).

Create a real-world scenario where finding the inverse of a function is necessary, and explain how you would solve it.

Hint: Think about situations where reversing a process is needed.