Functions And Inverses Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is the definition of a function?

Hint: Think about the relationship between inputs and outputs.

- ◯ **A) A relation where each input is related to exactly one output ✓**
- ◯ B) A relation where each input is related to multiple outputs
- ◯ C) A set of ordered pairs
- ◯ D) A process of finding the derivative

> A function is defined as a relation where each input is related to exactly one output.

Which of the following are properties of a one-to-one function?

Hint: Consider the characteristics that define one-to-one functions.

- ☐ **A) Each input has a unique output ✓**
- ☐ B) The function passes the vertical line test
- ☐ **C) The function passes the horizontal line test ✓**
- ☐ D) Every output is mapped from at least one input

> A one-to-one function has unique outputs for each input and passes the horizontal line test.

Explain what an inverse function is and how it relates to the original function.

Hint: Consider how the roles of inputs and outputs are reversed.

An inverse function reverses the mapping of the original function, such that if f(x) = y, then f^-1(y) = x.

List two conditions that must be met for a function to have an inverse.

Hint: Think about the properties of functions that allow for reversibility.

1. Condition 1

The function must be one-to-one.

2. Condition 2

The function must be onto.

A function must be one-to-one and onto to have an inverse.

What is the notation used to denote the inverse of a function f?

Hint: Consider common mathematical symbols for inverses.

- A) f^2
- **B) f^-1 ✓**
- C) f'
- D) f^(-1)

The notation for the inverse of a function f is f^-1.

Part 2: Understanding and Interpretation

Which test can be used to determine if a function has an inverse?

Hint: Think about the tests that assess function properties.

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

> The horizontal line test can be used to determine if a function has an inverse.

If a function is bijective, which of the following statements are true?

Hint: Consider the definitions of one-to-one and onto functions.

- ☐ **A) It is both one-to-one and onto ✓**
- ☐ **B) It has an inverse ✓**
- ☐ C) It is only one-to-one
- ☐ D) It is only onto

> A bijective function is both one-to-one and onto, and therefore has an inverse.

Describe how the domain and range of a function relate to the domain and range of its inverse.

Hint: Think about how inputs and outputs switch places.

> **The domain of the original function becomes the range of the inverse, and the range of the original function becomes the domain of the inverse.**

Part 3: Application and Analysis

Given the function f(x) = 2x + 3, what is the inverse function f^(-1)(x)?

Hint: Consider how to isolate x in the equation.

- ◯ **A) (x - 3)/2 ✓**
- ◯ B) 2x - 3
- ◯ C) x/2 + 3
- ◯ D) 2(x - 3)

> The inverse function is f^(-1)(x) = (x - 3)/2.

Which of the following functions have inverses?

Hint: Consider the properties of each function.

- ☐ **A) f(x) = x^2, x ≥ 0 ✓**
- ☐ **B) f(x) = x^3 ✓**
- ☐ C) f(x) = |x|
- ☐ **D) f(x) = 2x + 1 ✓**

> The functions f(x) = x^2 (x ≥ 0), f(x) = x^3, and f(x) = 2x + 1 have inverses, while f(x) = |x| does not.

Find the inverse of the function f(x) = (x - 5)^2, x ≥ 5, and explain your steps.

Hint: Think about how to reverse the operations applied to x.

> **The inverse is f^(-1)(x) = √x + 5, found by reversing the squaring operation.**

Which of the following graphs represents a function that has an inverse?

Hint: Consider the characteristics of the graphs.

- ◯ A) A parabola opening upwards
- ◯ **B) A straight line ✓**
- ◯ C) A circle

- ◯ D) A hyperbola

> A straight line represents a function that has an inverse.

Analyze the function f(x) = 3x - 4. Which of the following statements are true about its inverse?

Hint: Consider the properties of linear functions and their inverses.

- ☐ **A) The inverse is also a linear function ✓**
- ☐ B) The inverse will have a slope of 1/3
- ☐ C) The inverse is not defined
- ☐ D) The inverse will have a y-intercept of 4/3

> The inverse is also a linear function and will have a slope of 1/3.

Analyze the relationship between a function and its inverse graphically. How do their graphs relate to each other on the coordinate plane?

Hint: Think about symmetry and reflection.

> **The graphs of a function and its inverse are reflections of each other across the line y = x.**

Part 4: Evaluation and Creation

If a function f(x) = ax + b is not one-to-one, what can be concluded about its inverse?

Hint: Consider the implications of a function not being one-to-one.

- ◯ **A) The inverse does not exist ✓**
- ◯ B) The inverse is the same as the function
- ◯ C) The inverse is a quadratic function
- ◯ D) The inverse is undefined

> If a function is not one-to-one, its inverse does not exist.

Evaluate the following statements about inverse functions. Which are correct?

Hint: Consider the properties of inverse functions.

- [ ] A) The inverse of a function always exists
- [ ] **B) The inverse of a bijective function is unique ✓**
- [ ] C) Inverses are only defined for linear functions
- [ ] **D) The inverse of an inverse function is the original function ✓**

> The inverse of a bijective function is unique, but not all functions have inverses.

Create a real-world scenario where finding the inverse of a function is necessary. Explain the context and the solution.

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

> **An example could be calculating the original price of an item after a discount is applied, requiring the inverse of the discount function.**

Propose two different functions and describe how you would determine if they have inverses. Provide a brief explanation for each.

Hint: Consider the properties that allow for inverses.

1. Function 1

> f(x) = x + 1, which is one-to-one.

2. Function 2

> f(x) = x^2, which is not one-to-one.

> To determine if a function has an inverse, check if it is one-to-one and onto.