Composite Functions Worksheet

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Part 1: Building a Foundation

What is the notation for a composite function where \(f \) is applied to \(g \)?

Hint: Think about the symbols used for function composition.

- ◯ A) \(f + g \)
- ◯ B) \(f \times g \)
- ◯ C) \(f \circ g \)
- ◯ D) \(f - g \)

Which of the following statements are true about composite functions? (Select all that apply)

Hint: Consider the properties of function composition.

- ☐ A) \(f \circ g \) means \(g \) is applied first, then \(f \).
- ☐ B) The order of composition does not matter.
- ☐ C) The domain of \(f \circ g \) depends on the domain of \(g \).
- ☐ D) Composite functions are always commutative.

Explain in your own words what a composite function is and provide an example.

Hint: Think about how two functions can be combined.

List the two properties of composite functions discussed in the worksheet.

Hint: Recall the key properties mentioned earlier.

1. What is the first property?

2. What is the second property?

Part 2: Understanding and Interpretation

If \(f(x) = 3x + 2 \) and \(g(x) = x - 1 \), what is \((f \circ g)(x) \)?

Hint: Substitute \(g(x) \) into \(f(x) \).

- ◯ A) \(3x + 1 \)
- ◯ B) \(3(x - 1) + 2 \)
- ◯ C) \(3x - 1 \)
- ◯ D) \(3(x + 1) + 2 \)

Which of the following are necessary to determine the domain of a composite function \(f \circ g \)? (Select all that apply)

Hint: Consider the domains of both functions involved.

- ☐ A) The range of \(f \)
- ☐ B) The domain of \(g \)
- ☐ C) The domain of \(f \)
- ☐ D) The range of \(g \)

Describe how the associative property applies to composite functions with an example.

Hint: Think about how functions can be grouped.

Part 3: Application and Analysis

Given \(f(x) = x^2 \) and \(g(x) = \sqrt{x} \), find \((g \circ f)(x) \).

Hint: Substitute \(f(x) \) into \(g(x) \).

- ◯ A) \(x \)
- ◯ B) \(x^2 \)
- ◯ C) \(\sqrt{x^2} \)
- ◯ D) \(x^{1/4} \)

If \(f(x) = 2x + 1 \) and \(g(x) = x^3 \), which of the following are true about \((f \circ g)(x) \)? (Select all that apply)

Hint: Consider the characteristics of the resulting function.

- ☐ A) It is a linear function.
- ☐ B) It is a cubic function.
- ☐ C) The domain is all real numbers.
- ☐ D) The range is all real numbers.

Apply the concept of composite functions to describe a real-world scenario where one process depends on the outcome of another.

Hint: Think about processes that are interconnected.

Part 4: Evaluation and Creation

If \(f(x) = x + 5 \) and \(g(x) = 2x \), what is the inverse of \((f \circ g)(x) \)?

Hint: Consider how to reverse the operations of the composite function.

- ◯ A) \(\frac{x}{2} - 5 \)
- ◯ B) \(\frac{x - 5}{2} \)

- ◯ C) \(2x - 5 \)
- ◯ D) \(x - 10 \)

Analyze the following statements about \((f \circ g)(x) \) and \((g \circ f)(x) \). Which are true? (Select all that apply)

Hint: Consider the properties of function composition.

- ☐ A) They are always equal.
- ☐ B) They can have different domains.
- ☐ C) They can have different ranges.
- ☐ D) They are both associative.

Which of the following best evaluates the impact of domain restrictions on \((f \circ g)(x) \) when \(f(x) = \ln(x) \) and \(g(x) = x^2 \)?

Hint: Consider the domain of the logarithmic function.

- ◯ A) Domain is all real numbers.
- ◯ B) Domain is \(x > 0 \).
- ◯ C) Domain is \(x \neq 0 \).
- ◯ D) Domain is \(x \geq 0 \).

Create a composite function using \(f(x) = 1/x \) and \(g(x) = x - 3 \). Which of the following properties does it have? (Select all that apply)

Hint: Think about the characteristics of rational functions.

- ☐ A) It is undefined for \(x = 3 \).
- ☐ B) It is a rational function.
- ☐ C) It is undefined for \(x = 0 \).
- ☐ D) It has a horizontal asymptote.

Propose a new composite function using any two functions of your choice. Explain its domain, range, and potential applications in a real-world context.

Hint: Think creatively about how functions can interact.