Composition Of Functions Worksheet

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Part 1: Building a Foundation

What is the notation for the composition of functions \(f \) and \(g \)?

Hint: Think about the symbols used to represent function composition.

- ◯ \(f + g \)
- ◯ \(f \times g \)
- ◯ \(f \circ g \)
- ◯ \(f - g \)

Which of the following statements are true about function composition?

Hint: Consider the properties of function composition.

- ☐ The order of functions in composition matters.
- ☐ \((f \circ g)(x) = g(f(x)) \).
- ☐ The composition of functions can only be performed if the range of the first function is within the domain of the second.
- ☐ Function composition is commutative.

Explain in your own words what it means to compose two functions.

Hint: Think about how the output of one function becomes the input of another.

Identify the inner and outer functions in the composition \((f \circ g)(x) \).

Hint: Consider which function is applied first.

1. Inner function:

2. Outer function:

Part 2: Comprehension and Application

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

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

- ◯ \(2x^2 + 3 \)
- ◯ \(2x + 3x^2 \)
- ◯ \((2x + 3)^2 \)
- ◯ \(2(x^2) + 3 \)

Consider the functions \(f(x) = \sqrt{x} \) and \(g(x) = x - 1 \). Which of the following are true about the domain of \((f \circ g)(x) \)?

Hint: Think about the restrictions on the input values for each function.

- ☐ The domain is all real numbers.
- ☐ The domain is \(x \geq 1 \).
- ☐ The domain is \(x > 0 \).
- ☐ The domain is \(x \ leq 1 \).

Create a real-world scenario where composing two functions would be necessary, and describe the functions involved.

Hint: Think about situations where one process depends on another.

Given \(f(x) = 3x - 5 \) and \(g(x) = x + 4 \), find \((g \circ f)(2) \).

Hint: Calculate \(f(2) \) first, then use that result in \(g(x) \).

- ◯ 11
- ◯ 7
- ◯ 5
- ◯ 9

Part 3: Analysis, Evaluation, and Creation

If \(f(x) = x^2 \) and \(g(x) = \frac{1}{x} \), what is the domain of \((f \circ g)(x) \)?

Hint: Consider the restrictions imposed by each function.

- ◯ \(x \neq 0 \)
- ◯ \(x > 0 \)
- ◯ \(x < 0 \)
- ◯ All real numbers

Analyze the functions \(f(x) = 2x + 1 \) and \(g(x) = x^2 - 4 \). Which of the following statements are true about \((f \circ g)(x) \)?

Hint: Think about how the output of one function affects the input of another.

- ☐ The range of \(g(x) \) affects the domain of \(f \).
- ☐ \((f \circ g)(x) = 2(x^2 - 4) + 1 \).
- ☐ The composition is not defined for \(x = 2 \).
- ☐ The composition is defined for all real numbers.

Evaluate whether the functions \(f(x) = x + 1 \) and \(g(x) = x - 1 \) are inverses. Justify your answer.

Hint: Consider the definition of inverse functions.

Design a pair of functions \(f(x) \) and \(g(x) \) such that their composition \((f \circ g)(x) \) results in a linear function. Explain your reasoning.

Hint: Think about how to combine functions to achieve a linear result.