Composition Of Functions Worksheet Questions and Answers PDF

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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.

- ○ \(f + g \)
- ○ \(f \times g \)
- ○ **\(f \circ g \)** ✓
- ○ \(f - g \)

> The correct notation for the composition of functions is \(f \circ g \).

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.

> The order of functions matters, and the composition can only be performed if the range of the first function is within the domain of the second.

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.

To compose two functions means to apply one function to the result of another function.

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

Hint: Consider which function is applied first.

1. Inner function:

g(x)

2. Outer function:

f(x)

The inner function is \(g(x) \) and the outer function is \(f(x) \).

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 \(f(x) \).

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

The composition \((f \circ g)(x) \) results in \(2x^2 + 3 \).

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 \(x \ leq 1 \).

The domain of \((f \circ g)(x) \) is \(x \geq 1 \).

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.

An example could be calculating the total cost of an item after tax, where one function calculates the price and another calculates tax.

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

The result of \((g \circ f)(2) \) is 11.

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

> The domain of \((f \circ g)(x) \) is \(x \neq 0 \).

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. ✓**

> The range of \(g(x) \) affects the domain of \(f \), and 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.

> **The functions are inverses because \(f(g(x)) = x \) and \(g(f(x)) = x \).**

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.

An example could be \(f(x) = 2x \) and \(g(x) = x + 3 \), resulting in a linear function.