Compound Functions Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is the notation for a compound function?

Hint: Think about how functions are combined.

- ◯ A) f(x) + g(x)
- ◯ B) f(x) × g(x)
- ◯ **C) (f ∘ g)(x) ✓**
- ◯ D) f(x) - g(x)

> The correct notation for a compound function is (f ∘ g)(x).

Which of the following statements are true about compound functions?

Hint: Consider how functions interact with each other.

- ☐ A) They are formed by adding two functions.
- ☐ **B) They are formed by applying one function to the results of another. ✓**
- ☐ C) The order of functions does not matter.
- ☐ **D) They can be expressed as (f ∘ g)(x) = f(g(x)). ✓**

> Compound functions are formed by applying one function to the results of another and can be expressed as (f ∘ g)(x) = f(g(x)).

Explain why the order of operations is important in compound functions.

Hint: Think about how changing the order affects the output.

The order of operations is crucial because it determines how the input is transformed through the functions, leading to different outputs.

List the two main components needed to form a compound function.

Hint: Think about the basic elements of function composition.

1. First component

f(x)

2. Second component

g(x)

The two main components are the two functions that are being composed.

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

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

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

The correct answer is (f ∘ g)(x) = 2(x^2) + 3.

Part 2: comprehension and Application

Describe how the domain of the function g(x) affects the domain of the compound function (f ∘ g)(x).

Hint: Consider the restrictions imposed by g(x).

The domain of g(x) directly affects the domain of (f ∘ g)(x) because g(x) must produce valid inputs for f(x).

If g(x) = √x and f(x) = x + 5, what is the domain of (f ∘ g)(x)?

Hint: Think about the restrictions of the square root function.

- **A) x ≥ 0 ✓**
- B) x > 0
- C) All real numbers
- D) x ≤ 0

The domain of (f ∘ g)(x) is x ≥ 0 due to the square root function.

Given f(x) = 3x - 4 and g(x) = x^2 + 1, find (f ∘ g)(2).

Hint: Calculate g(2) first, then substitute into f.

First, calculate g(2) = 5, then f(5) = 11, so (f ∘ g)(2) = 11.

For the functions f(x) = x^3 and g(x) = 2x + 1, calculate (g ∘ f)(1) and (f ∘ g)(1).

Hint: Evaluate each function step by step.

1. (g ∘ f)(1)

> 3

2. (f ∘ g)(1)

> 2

> (g ∘ f)(1) = 3 and (f ∘ g)(1) = 2.

Part 3: Analysis, Evaluation, and Creation

Analyze the function (f ∘ g)(x) = sin(ln(x)). Discuss the domain of this compound function.

Hint: Consider the restrictions of the logarithm and sine functions.

> **The domain is x > 0 due to the logarithm, as it cannot take non-positive values.**

Which of the following transformations occur when graphin (f ∘ g)(x) = |x^2 - 4|?

Hint: Think about how absolute values affect graphs.

- [ ] **A) Vertical reflection ✓**

- [ ] B) Horizontal shift
- [ ] **C) Vertical stretch ✓**
- [ ] D) Horizontal reflection

> The graph undergoes vertical reflection and vertical stretch due to the absolute value.

Evaluate the compound function (f ∘ g)(x) = √(x^2 - 1) for its potential applications in physics. Discuss any limitations based on its domain.

Hint: Consider the physical meaning of the square root function.

> **The function can model certain physical scenarios, but its domain limits its applicability to x ≥ 1.**

Create a compound function using f(x) = x^2 + 2x and g(x) = 1/x. Identify its domain and range.

Hint: Combine the functions and analyze their properties.

1. Domain

> x ≠ 0

2. Range

> y > 0

> The compound function is (f ∘ g)(x) = (1/x)^2 + 2(1/x), with domain x ≠ 0.

If f(x) = cos(x) and g(x) = 2x, what is the period of the compound function (f ∘ g)(x)?

Hint: Consider the periodic nature of the cosine function.

- ◯ A) π
- ◯ **B) 2π ✓**
- ◯ C) π/2
- ◯ D) 4π

> The period of (f ◦ g)(x) is 2π, as the cosine function has a period of 2π.