

Compound Functions Worksheet

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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) $f(x) \times g(x)$
- C) $(f \cdot g)(x)$
- D) $f(x) - g(x)$

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 $(f \cdot g)(x) = f(g(x))$.

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

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

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

Hint: Think about the basic elements of function composition.

1. First component

2. Second component

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

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

- A) $2x^2 + 3$
- B) $2x + 3x^2$
- C) $2(x^2) + 3$
- D) $2x^2 - 3$

Part 2: comprehension and Application

Describe how the domain of the function $g(x)$ affects the domain of the compound function $(f \circ g)(x)$.

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

If $g(x) = \sqrt{x}$ and $f(x) = x + 5$, what is the domain of $(f \circ g)(x)$?

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

- A) $x \geq 0$
- B) $x > 0$
- C) All real numbers
- D) $x \leq 0$

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

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

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

Hint: Evaluate each function step by step.

1. $(g \circ f)(1)$

2. $(f \circ g)(1)$

Part 3: Analysis, Evaluation, and Creation

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

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

Which of the following transformations occur when graphing $(f \circ g)(x) = |x^2 - 4|$?

Hint: Think about how absolute values affect graphs.

- A) Vertical reflection
- B) Horizontal shift
- C) Vertical stretch
- D) Horizontal reflection

Evaluate the compound function $(f \cdot g)(x) = \sqrt{(x^2 - 1)}$ for its potential applications in physics. Discuss any limitations based on its domain.

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

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

2. Range

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

Hint: Consider the periodic nature of the cosine function.

- A) π
- B) 2π
- C) $\pi/2$
- D) 4π