

Course 18 Functions and Their Graphs

Module: Composite Functions

Objective: To practice finding composite functions, their values, and the simpler functions that make up composite functions

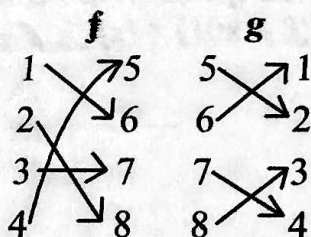
Name: _____ **Date:** _____

Complete each statement.

- A composite function is formed of two _____ functions.
- To find $(f \circ g)(x)$, follow these steps:
First, evaluate _____.
Then evaluate _____ for that output value.
- You can work _____ from a composite function to find the simpler functions that it is built upon.
- **Circle one.** true or false: $(f \circ g)(x) = (g \circ f)(x)$

Problem Set:

Part I. Find the value of the composite function.



1. $(f \circ g)(8) =$ _____
2. $(f \circ g)(7) =$ _____
3. $(g \circ f)(3) =$ _____
4. $(g \circ f)(4) =$ _____

Part II.

Example 1: $f(x) = 2x - 7$ and $g(x) = (x + 4)^2$

A. Find the value of the composite function.

5. $(f \circ g)(3) =$ 3
6. $(g \circ f)(3) =$ _____
7. $(f \circ g)(16) =$ _____
8. $(g \circ f)(16) =$ _____
9. $(f \circ g)(-6) =$ _____
10. $(g \circ f)(-6) =$ _____

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B. Write the expression for the composite function.

11. $(f \circ g)(x) =$ _____

12. $(g \circ f)(x) =$ _____

Example 2: $f(x) = (x^2 - 8)^2$ and $g(x) = \frac{1}{2}x - 7$

A. Find the value of the composite function.

13. $(f \circ g)(4) =$ _____

14. $(g \circ f)(4) =$ _____

15. $(f \circ g)(6) =$ _____

16. $(g \circ f)(6) =$ _____

17. $(f \circ g)(8) =$ _____

18. $(g \circ f)(8) =$ _____

B. Write the expression for the composite function.

19. $(f \circ g)(x) =$ _____

20. $(g \circ f)(x) =$ _____

Part III. Find the missing simpler function that forms the composite function.

$$f(x) = (10x - 3)^4 = (h \circ g)(x)$$

21. $g(x) =$ _____ $h(x) = x^4$

Reflection:

Choose one of the Part II examples and explain in your own words why $f \circ g$ and $g \circ f$ are different.

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5. Write the restricted domain of $f \circ g$. _____

6. Write the restricted domain of $g \circ f$. _____

Example 2: Let $f(x) = x^2$ and $g(x) = \frac{1}{x-5}$

7. Circle the values below that are in the domain of $f \circ g$. Draw a box around those that are not.

-5 $-\frac{1}{2}$ $3\sqrt{2}$ $\sqrt{4}$ -4 $\sqrt{5}$ 5 0

8. Circle the values below that are in the domain of $g \circ f$. Draw a box around those that are not.

-5 $-\frac{1}{2}$ $\sqrt{2}$ 3 $\sqrt{4}$ $-\sqrt{5}$ 16 5

9. Write the restricted domain of $f \circ g$. _____

10. Write the restricted domain of $g \circ f$. _____

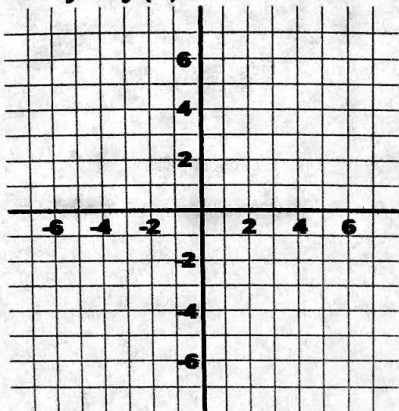
Reflection:

With a graphing calculator, graph a function used in this activity that has a restricted domain. Then describe in your own words how the graph represents or illustrates the restrictions on the domain.

Problem Set:

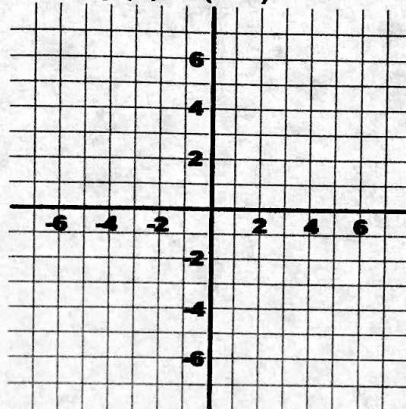
Complete the data table for the function and then graph it. Use a calculator as needed.

1. $y = f(x) = 2^x$



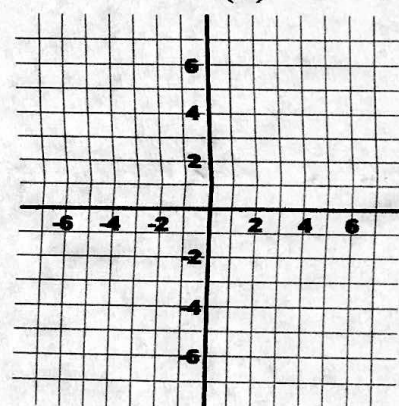
x	y
3	8
2	4
1	2
0	1
-1	
-2	
-3	

2. $y = f(x) = (1.5)^x$



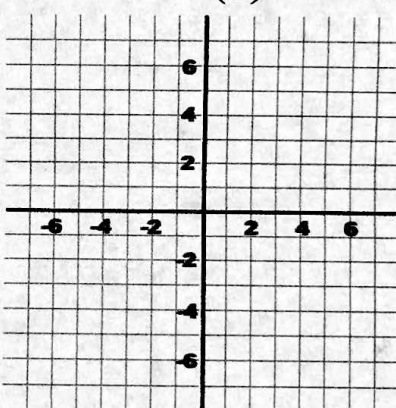
x	y
3	
2	
1	
0	
-1	
-2	
-3	

3. $y = f(x) = \left(\frac{1}{3}\right)^x$



x	y
3	
2	
1	
0	
-1	
-3	
-2	

4. $y = f(x) = \left(\frac{1}{2}\right)^x$



x	y
3	
2	
1	
0	
-1	
-2	
-3	

Reflection:

Alex and Grace were discussing exponential functions of the form $y = f(x) = a^x$ where a is greater than 1. Both agreed that as the value of x increases, $f(x)$ approaches positive infinity. However, as the value of x decreases, they disagreed on the behavior of the function. Alex said that $f(x)$ will equal zero for very small values of x . Grace said that $f(x)$ will approach zero, but never equal it. Who is correct and why? State your reasons below.
