

Exploration 1-4a: Composition of Functions

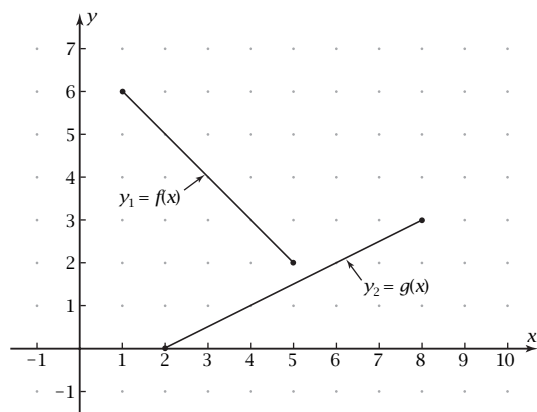
Date: _____

Objective: Find the composition of one function with another.

1. The figure shows two linear functions, f and g . Write the domain and range of each function.

f : Domain: _____ Range: _____

g : Domain: _____ Range: _____



2. Read values of $g(x)$ from the graph and write them in this table. If the value of x is out of the domain, write "none."

x	$g(x)$
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

3. The symbol $f(g(x))$ is read " f of g of x ." It means find the value of $g(x)$ first, and then find f of the answer. For instance, $g(5) = 1.5$. So $f(g(5)) = f(1.5) = 5.5$. Put another column into the table for values of $f(g(x))$. Write "none" where appropriate.

4. Show in the table an instance where $g(x)$ is defined but $f(g(x))$ is not defined.

5. Plot the values of $f(g(x))$ on the figure in Problem 1. If the points do not lie in a straight line, go back and check your work.

6. The function in Problem 5 is called the **composition** of f with g , which can be written $f \circ g$. What are the domain and range of $f \circ g$?

Domain: _____ Range: _____

7. Find equations for functions f and g .

8. Enter in your grapher the f and g equations as y_1 and y_2 , respectively. Use Boolean variables to make the functions have the proper domains. Then plot the graphs. Does the result agree with the given figure?

9. Enter $f \circ g$ in y_3 by entering $y_1(y_2(x))$. Plot this graph. Does it agree with the graph you drew in Problem 5?

10. By suitable algebraic operations on the equations in Problem 7, find an equation for $f(g(x))$. Simplify the equation as much as possible.

11. What did you learn as a result of doing this Exploration that you did not know before?