

## Function Composition

Perform the indicated operation.

1)  $f(x) = -4x + 4$   
 $g(x) = 3x - 5$   
Find  $f(g(x))$

2)  $g(x) = 3x + 1$   
 $f(x) = x^3 - 4x$   
Find  $g(f(x))$

3)  $g(x) = x^2 + 2x$   
 $h(x) = 3x + 2$   
Find  $g(h(x))$

4)  $g(n) = n^2 - 4$   
 $h(n) = 3n$   
Find  $g(h(n))$

5)  $g(x) = x^2 - 3x$   
 $f(x) = 2x + 1$   
Find  $g(f(x))$

6)  $g(x) = 3x + 5$   
 $f(x) = x^3 + 2x$   
Find  $g(f(x))$

7)  $g(x) = 4x - 5$   
 $h(x) = x^2 - 3x$   
Find  $g(h(x))$

8)  $f(a) = 2a$   
 $g(a) = a^2 - 3a$   
Find  $f(g(a))$

9)  $f(x) = 4x - 4$   
 $g(x) = x^2 - 5x$   
Find  $f(g(2))$

10)  $g(n) = n - 3$   
 $h(n) = n^3 - 4n$   
Find  $(g \circ h)(-6)$

11)  $g(x) = x - 5$   
 $h(x) = x + 4$   
 Find  $g(h(0))$

12)  $f(x) = 2x - 4$   
 $g(x) = x - 4$   
 Find  $(f \circ g)(1)$

13)  $g(a) = 2a - 5$   
 $f(a) = a^2 + 5a$   
 Find  $(g \circ f)(7)$

14)  $f(x) = x - 2$   
 $g(x) = -4x - 4$   
 Find  $(f \circ g)(-9)$

15)  $g(x) = 3x + 4$   
 $h(x) = 4x + 1$   
 Find  $(g \circ h)(-4)$

16)  $h(n) = 3n - 4$   
 $g(n) = 4n - 3$   
 Find  $h(g(8))$

17) Jim wants to calculate the cost of running his lawn mowers. The mowers consume 2.5 gallons of gasoline each hour. Gasoline costs \$3.50 per gallon.

- Write a function  $g(h)$  that gives the number of gallons  $g$  that the mowers will use in  $h$  hours. Identify the units of the domain and range.
- Write a function  $c(g)$  for the cost  $c$  in dollars for  $g$  gallons of gasoline. Identify the units of the domain and range.
- Use composition of functions to create a function for the cost  $c$  in dollars of gasoline to mow  $h$  hours. Identify the units of the domain and range. Then explain how the domain and range of the composite function are related to the domain and range of  $g(h)$  and  $c(g)$ .
- Use the composite function in Item 15 to determine the cost of gasoline to mow 12 hours. Show your work.
- What is the slope of the composite function, and what does it represent in this situation?