Math Lab: Function Composition

1] Sally Salesperson sells shoes part time at Super Shoes in the South Street Mall. She earns a 2% commission on total sales over $5,000, which is paid as a bonus at the end of the year. Sally sold $9,172 in shoes this year. How much will her bonus be? Show your work.

Function composition is applying one function to the results of another. Composition has its own notation: $(f \circ g)(x)$, which reads "f composed with g of x". It means to first evaluate $g(x)$ and then substitute that result into f. So, $(f \circ g)(x) = f(g(x))$.

2] In the Sally Salesperson problem above, let her total sales be represented by x, and

$f(x) = x - 5000$

$g(x) = 0.02x$

Which composition of functions would calculate her bonus at the end of the year?

$(f \circ g)(x)$ or $(g \circ f)(x)$

Explain your reasoning.

3] Owen Owner asked Manny Manager at Super Shoes to tell him the total amount of bonuses the company will pay out at the end of the year. Manny wants a single function, rather than two separate functions, to calculate the bonuses for the rest of the sales staff. To compose the two functions into one, substitute one into the other as follows…
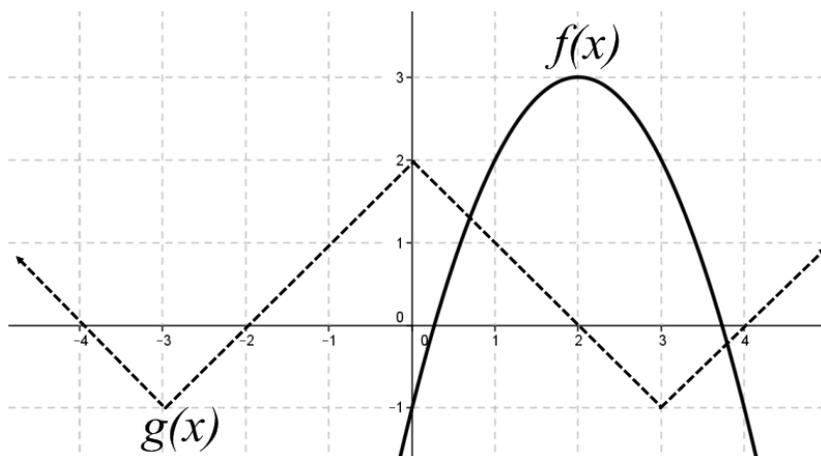
$(g \circ f)(x) = g(f(x)) = g($ $) = 0.02($ $) =$

4] What is the total amount of bonuses the company will pay this year?

Employee	Total Annual Sales	Bonus
Sally Salesperson	$9,172	
Bobby Socks	$15,224	
Henrietta Heels	$25,780	
Archy Soles	$4,298	
Lance Laces	$13,662	
Bella Bootsella	$7,345	
	Total:	

Evaluating Composite Functions in a Graph

Use the graphs of $f(x)$ and $g(x)$ to determine the value of each composite function.

$f(x)$

$g(x)$

5] $(f \circ g)(x) = f(g(2)) = f(\quad) =$

6] $(f \circ g)(-1) =$

7] $(f \circ g)(1) =$

8] $(f \circ g)(0) =$

9] $(g \circ f)(2) = g(f(2)) = g(\quad) =$

10] $(g \circ f)(4) =$

11] $(g \circ f)(0) =$

12] $(g \circ f)(3) =$

Evaluating Composite Functions in a Table

Use the tables of ordered pairs of $f(x), g(x), h(x),$ and $j(x)$ to determine the value of each composite function.

$f(x) = 3x + 2$		$g(x) = -x + 5$		$h(x) = x^2 - 15$		$j(x) = \sqrt{x}$	
x	$f(x)$	x	$g(x)$	x	$h(x)$	x	$j(x)$
-3	-7	-4	9	1	-14	1	1
-2	-4	-2	7	2	-11	4	2
-1	-1	0	5	3	-6	9	3
0	2	2	3	4	1	16	4
1	5	4	1	5	10	25	5
2	8	6	-1	6	21	36	6
3	11	8	-3	7	34	49	7

13] $(f \circ g)(8) =$

14] $(h \circ f)(1) =$

15] $(h \circ g)(-2) =$

16] $(f \circ j)(9) =$

17] $(g \circ j)(36) =$

18] $(g \circ f)(2) =$

19] $(j \circ g)(-4) =$

20] $(h \circ j)(25) =$

Evaluating Composite Functions Algebraically

$f(x) = 4x^{1/3}$ $\qquad$ $g(x) = \frac{2}{x+1}$ $\qquad$ $h(x) = 8x^3$ $\qquad$ $j(x) = 2x - 5$ $\qquad$ $k(x) = 4x^{-1}$

21] $(f \circ h)(4) = f\big(h(4)\big) = f(\quad) = 4(\quad)^{1/3} =$

22] $(k \circ g)(5) =$

23] $(g \circ j)(3) =$

24] $(h \circ k)(-2) =$

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$f(x) = 4x^{1/3}$ $\qquad$ $g(x) = \frac{2}{x+1}$ $\qquad$ $h(x) = 8x^3$ $\qquad$ $j(x) = 2x - 5$ $\qquad$ $k(x) = 4x^{-1}$

25] $(f \circ h)(x) = f\big(h(x)\big) = f(\quad) = 4(\quad)^{1/3} =$

26] $(k \circ g)(x) =$

27] $(g \circ j)(x) =$

28] $(h \circ k)(x) =$