Function Composition

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

To evaluate the function f composed with the function g, first evaluate g(x) and then use that result to evaluate f(x).

Example 1 Composing Functions from Tables

Evaluate the 2nd function first,
then use that result to evaluate the first function.

$f(x) = 3x + 2$	
x	$f(x)$
-3	-7
-2	-4
-1	-1
0	2
1	5
2	8
3	11

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

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

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

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

4] $(f \circ f)(0) =$

Example 2 Composing Functions from Graphs

Evaluate the 2nd function first,
then use that result to evaluate the first function.

[A] $(g \circ f)(3) =$

[B] $(f \circ h)(-3) =$

[C] $(h \circ g)(4) =$

[D] $(f \circ f)(5) =$

Example 3 Composing Functions Algebraically

Evaluate the 2nd function first,
then use that result to evaluate the first function.

$f(x) = 8x + 3$	$g(x) = 2x - 10$	$h(x) = x^2$	$j(x) = \frac{1}{x}$

[A] $(f \circ j)(4) =$

[B] $(h \circ g)\left(\frac{1}{2}\right) =$

[C] $(f \circ g)(x) =$

[D] $(g \circ f)(x) =$

Example 4 Using Composition

Matt and Mary made their way to Mega Mart for mammoth muffins on Monday. Mary has a coupon for $5.00 off a box of muffins and Maryland sales tax is 6%. Let the cost of the muffins be x. Write a function f(x) for the sale price of the muffins.

Write a function g(x) for the cost of the muffins after tax.

Which composition of functions would calculate Matt and Mary's bill at the checkout?