What you should learn:

- 1) Find the composition of one function with another function.
- 2) Use compositions of functions to model and solve real-life problems.

* Composition of Two Functions	
*Definition	*Diagram

Example 4 Composition of Functions

Given f(x) = x + 2 and $g(x) = 4 - x^2$, find the following.

a.
$$(f \circ g)(x)$$

b.
$$(g \circ f)(x)$$

a.
$$(f \circ g)(x)$$
 b. $(g \circ f)(x)$ **c.** $(g \circ f)(-2)$

Example 5 Finding the Domain of a Composite Function

Given $f(x) = x^2 - 9$ and $g(x) = \sqrt{9 - x^2}$, find the composition $(f \circ g)(x)$. Then find the domain of $(f \circ g)$.

Example 6 Decomposing a Composite Function

Write the function given by $h(x) = \frac{1}{(x-2)^2}$ as a composition of two functions.

Example 7 Bacteria Count



The number N of bacteria in a refrigerated food is given by

$$N(T) = 20T^2 - 80T + 500, \quad 2 \le T \le 14$$

where T is the temperature of the food in degrees Celsius. When the food is removed from refrigeration, the temperature of the food is given by

$$T(t) = 4t + 2, \qquad 0 \le t \le 3$$

where t is the time in hours. (a) Find the composition N(T(t)) and interpret its meaning in context. (b) Find the time when the bacterial count reaches 2000.

Homework: p. 89-92 #31-41(odd), 47-53(odd), 63, 65, 67