

## L4 – 8.3 Composite Functions

MHF4U

Two functions,  $f$  and  $g$  can be combined using a process called composition, which can be represented by:

This is read as “ $f$  composite  $g$ ”

### Part 1: Determine the Composition of Two Functions

To determine an equation for a composite function, substitute the second function into the first.

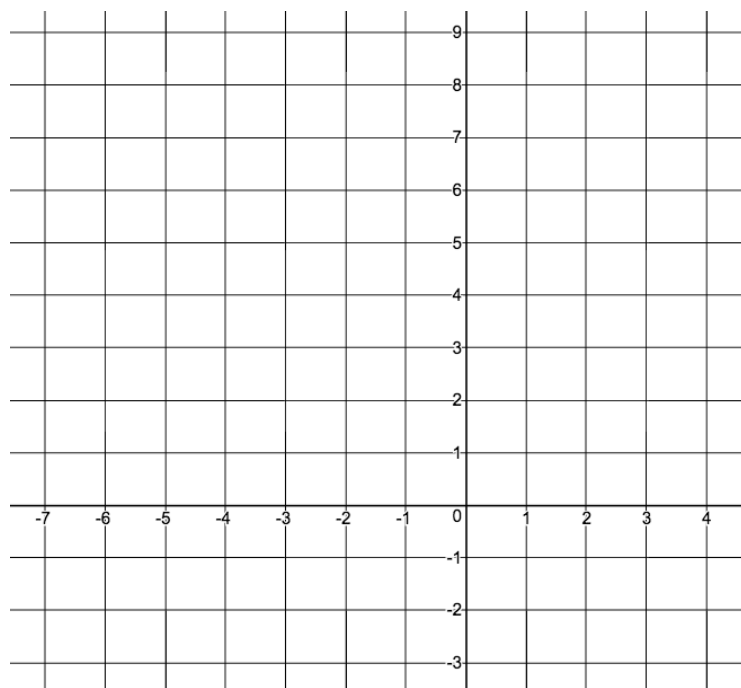
To determine  $f(g(x))$ , substitute  $g(x)$  in for  $x$  in to  $f(x)$

**Example 1:** If  $f(x) = x^2$  and  $g(x) = x + 3$ , determine an equation for each composite function and then graph the function.

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

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

**c)**  $g^{-1}(g(x))$



## **Part 2: Evaluate a Composite Function**

To evaluate a composite function  $f(g(x))$  at a specific value, evaluate  $g(x)$  at the specific value and then substitute the result in to  $f(x)$ .

**Example 2:** If  $u(x) = x^2 + 3x + 2$  and  $w(x) = \frac{1}{x-1}$

**a)** Evaluate  $(u \circ w)(2)$

**b)** Evaluate  $w(u(-3))$

### **Part 3: Application**

**Example 3:** The number of rabbits,  $R$ , in a wildlife reserve as a function of time,  $t$ , in years can be modelled by the function  $R(t) = 50 \cos(t) + 100$ . The number of wolves,  $W$ , in the same reserve can be modelled by the function  $W(t) = 0.2[R(t - 2)]$ . Find the full equation for  $W(t)$