

# Algebra 2A Notes

Name: \_\_\_\_\_

## 6-6 Function Operations

Date: \_\_\_\_\_ Hr: \_\_\_\_\_

### Objectives:

1. To add, subtract, multiply, and divide functions.
2. To find the composite of two functions.

### Common Core Content Standards:

F.BF.1.b Combine standard function types using arithmetic operations

F.BF.1.c Compose functions

### Review:

A \_\_\_\_\_ is a relation in which each element of the domain corresponds with exactly one element in the range. (ex.:  $f(x) = 3x^3 - 2x + 3$ )

You can add, subtract, multiply, and divide functions.

Take note

#### Key Concepts Function Operations

Addition  $(f + g)(x) = f(x) + g(x)$

Subtraction  $(f - g)(x) = f(x) - g(x)$

Multiplication  $(f \cdot g)(x) = f(x) \cdot g(x)$

Division  $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, g(x) \neq 0$

The domains of the sum, difference, product, and quotient functions consist of the  $x$ -values that are in the domains of *both*  $f$  and  $g$ . Also, the domain of the quotient function does not contain any  $x$ -value for which  $g(x) = 0$ .

### Example 1: Adding and Subtracting Functions

Let  $f(x) = 5x^3 + 1$  and  $g(x) = x^2 - 4$ . What are a.)  $f + g$  and b.)  $f - g$  ?

### Example 2: Multiplying and Dividing Functions

Let  $f(x) = x^2 + x - 6$  and  $g(x) = x - 2$ . What are a.)  $f \cdot g$  and b.)  $\frac{f}{g}$  and the domain?

A composition function is a combination of two functions such that the output from the first function becomes the input for the second function.

Take note

#### Key Concept Composition of Functions

The composition of function  $g$  with function  $f$  is written as  $g \circ f$  and is defined as  $(g \circ f)(x) = g(f(x))$ . The domain of  $g \circ f$  consists of the  $x$ -values in the domain of  $f$  for which  $f(x)$  is in the domain of  $g$ .

$$(g \circ f)(x) = g(\underbrace{f(x)}_2)$$

1. Evaluate  $f(x)$  first.  
2. Then use  $f(x)$  as the input for  $g$ .

Function composition is not commutative since  $f(g(x))$  does not always equal  $g(f(x))$ .

### Example 3: Composing Functions

Let  $f(x) = x^2 + 1$  and  $g(x) = x - 2$ . What is a.)  $(g \circ f)(x)$  and b.)  $(g \circ f)(-2)$ ?

### Example 4: Using Composite Functions

A car manufacturer offers a \$2000 rebate, but the buyer must pay the 7% sales tax on the full price of the car. Write a composite function to represent the cost to purchase a car listed for  $x$  dollars.