

# Composition of Functions and Function Operations

## Day 1

### Goals:

Students should be able to add, subtract, multiply, and divide functions and determine the new domain.

Students should be able to evaluate a function.

### Composition of Functions and Function Operations

Combine and find the domain of functions by adding, subtracting, multiplying or dividing given the following functions.

$$f(x) = 2x + 1$$

$$g(x) = x^2 - 7x - 8$$

$$h(x) = x - 8$$

1.)  $(f+h)(x) = f(x) + h(x)$

$$2x + 1 + x - 8$$

$$(f+h)(x) = 3x - 7$$

$$D: (-\infty, \infty)$$

3.)  $\frac{h(x)}{g(x)}$

$$\frac{x-8}{x^2-7x-8}$$

$$\frac{-8}{-7} \cdot \frac{x-8}{(x-8)(x+1)}$$

$$\frac{1}{x+1}$$

$$D: (-\infty, -1) \cup (-1, \infty)$$

2.)  $(fh)(x) = f(x) \cdot h(x)$

$$(2x+1)(x-8)$$

$$2x^2 - 16x + 1x - 8$$

$$(fh)(x) = 2x^2 - 15x - 8$$

$$D: (-\infty, \infty)$$

4.)  $3g(x) - 2f(x)$

$$3(x^2 - 7x - 8) - 2(2x + 1)$$

$$3x^2 - 21x - 24 - 4x - 2$$

$$3x^2 - 25x - 26$$

$$D: (-\infty, \infty)$$

Given:  $f(x) = 3x - 4$        $h(x) = 2x^2 - x - 6$        $g(x) = 2x + 3$



5.)  $f(x) \cdot g(x)$   
 $(3x-4)(2x+3)$   
 $6x^2 + 9x - 8x - 12$   
 $6x^2 + x - 12$   
 $D: (-\infty, \infty)$

6.)  $\frac{h(x)}{g(x)}$   
 $\frac{2x^2 - x - 6}{2x + 3}$   
 $\frac{(2x^2 + 3x) - (4x - 6)}{(2x + 3)}$   
 $\frac{x(2x + 3) - 2(2x + 3)}{(2x + 3)}$   
 $\frac{(2x + 3)(x - 2)}{(2x + 3)}$   
 $D: (-\infty, \infty) \quad \boxed{x - 2}$

7.)  $(f - h)(x)$   
 $3x - 4 - (2x^2 - x - 6)$   
 $3x - 4 - 2x^2 + x + 6$   
 $-2x^2 + 4x + 2$   
 $D: (-\infty, \infty)$

8.)  $4f(x) - 2g(x)$   
 $4(3x - 4) - 2(2x + 3)$   
 $(12x - 16) - (4x + 6)$   
 $8x - 22$

Evaluate functions by substituting the function's variable with the given value or expression.

$f(x) = 2x + 1$

$g(x) = x^2 - 7x - 8$

$h(x) = x - 8$

1.)  $g(2) = ( )^2 - 7( ) - 8$   
 $= (2)^2 - 7(2) - 8$   
 $= 4 - 14 - 8 = \boxed{-18}$

2.)  $f(x-3) = 2( ) + 1$   
 $= 2(x-3) + 1$   
 $= 2x - 6 + 1$   
 $= \boxed{2x - 5}$

3.)  $h(x+2)$

4.)  $g(4) - f(1)$

$( )^2 - 7( ) - 8$	$2( ) + 1$
$(4)^2 - 7(4) - 8$	$2(1) + 1$
$16 - 28 - 8$	
$-20$	$3 = \boxed{-23}$

Given:  $f(x) = 3x - 4$        $h(x) = 2x^2 - x - 6$        $g(x) = 2x + 3$

5.)  $f(-3)$

6.)  $\frac{h(2)}{g(1)}$

7.)  $(f - h)(5)$

8.)  $4f(-2) - 2g(6)$

HW:

pg. 116 BLUE SECTION

(1, 2, 7, 8)

$$\begin{aligned} & (x-2)^2 + 3 \\ & (x-2)(x-2) + 3 \\ & x^2 - 2x - 2x + 4 + 3 \end{aligned}$$