

### Warm-Up

1. Identify the vertical and horizontal asymptote:  $\frac{5}{x-3} + 7$   
V.A  $x=3$  H.A  $y=7$

2. Identify the domain and range:  $\sqrt{x-7}$   
D:  $[7, \infty)$  R:  $[0, \infty)$

3. Write the equation when the parent function  $f(x) = x^3$  has a horizontal translation right 3 and reflects across the x-axis

$$f(x) = -(x-3)^3$$

4. Evaluate and Graph the piecewise function:  $f(x) = \begin{cases} 2x, & x \leq 5 \\ 2, & x > 5 \end{cases}$

$$f(6) \\ 2$$

$$f(5) \\ 10$$

$$f(10) \\ 2$$

### Review:

1. Identify the transformation:  $f(x) = -5(x-3)^2 + 7$



### ACT Question of the Day

6. Jorge's current hourly wage for working at Denti Smiles is \$12.00. Jorge was told that at the beginning of next month, his new hourly wage will be an increase of 6% of his current hourly wage. What will be Jorge's new hourly wage?

F. \$12.06

G. \$12.60

H. \$12.72

J. \$18.00

K. \$19.20

$$12 \cdot x \cdot 0.06 = 0.72$$

$$12 + 0.72$$

$$= \$12.72$$

$$12 \cdot x \cdot 1.06$$

$$= 12.72$$

$$f(x) = \begin{cases} 2x + 4, & x < 3 \\ 5, & 3 \leq x \leq 5 \\ 3x, & x > 5 \end{cases}$$

7. evaluate:  $f(-2)$



## Unit 1: Functions

### Function Compositions

A composition of a function is when one function is inside of another.

The notation used for the composition of function looks like

this  $(f \circ g)(x)$ : the composition of the function  $f$  with  $g$  is defined as follows -  $(f \circ g)(x) = f(g(x))$ .

What do you notice about the function?

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

$g(x)$  is inside  $f(x)$

Example 1:

$$f(x) = x + 3$$

$$g(x) = 2x$$

evaluate  $f(3)$ :

$$x = 3$$

$$f(3) = 3 + 3$$

$$f(3) = 6$$

evaluate  $2f(3)$

$$2f(3) = 2(6)$$

$$2f(3) = 12$$

evaluate  $f(g(2))$

$$g(2) = 2(2)$$

$$g(2) = 4$$

$$f(4) = 4 + 3 = \boxed{7}$$

Example 2: Your Turn

$$f(x) = x + 4$$

$$g(x) = 3x$$

evaluate  $f(5)$   $f(5) = 5 + 4 = 9$

evaluate  $2f(5)$

$$18$$

evaluate  $g(f(1))$

$$g(f(1))$$

$$f(1) = 1 + 4$$

$$f(1) = 5$$

$$g(5) = 3(5)$$

$$g(5) = 15$$

example 3:

$$f(x) = 3x + 1 \quad g(x) = 2x$$

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

$$f(g(x))$$

$$f(2x) \quad x = 2x$$

$$3(2x) + 1$$

$$3(2x) + 1$$

$$\boxed{6x + 1}$$

example 4: evaluate  $(g \circ f)(x)$

$$1. g(f(x))$$

$$g(3x+1) \quad x = 3x+1$$

$$2(x)$$

$$3x+1$$

$$2(3x+1)$$
$$\boxed{6x + 2}$$

example 5: Your Turn

$$f(x) = x - 3 \quad g(x) = x^3$$

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

$$f(g(x))$$

$$f(x^3) \quad x = x^3$$

$$\cancel{(x)} - 3 \quad \boxed{x^3 - 3}$$

example 6: evaluate  $g(f(x))$

$$g(x-3)$$

$$x = x-3$$

$$g(x) = (x)^3$$

$$= (x-3)^3$$

## Black History Fact of the day

"Lift Every Voice and Sing" — often referred to as the "Black American National Anthem"— is a song written as a poem by [James Weldon Johnson](#) (1871-1938) in 1899 and set to music by his brother [John Rosamond Johnson](#) (1873-1954) in 1905. It is one of the authorized hymns in the [Episcopal](#) hymnal.

"Lift Every Voice and Sing" was publicly performed first as a poem as part of a celebration of [Abraham Lincoln's](#) birthday on February 12, 1900, by 500 school children at the segregated [Stanton School](#) in [Jacksonville, Florida](#). Its principal, [James Weldon Johnson](#), wrote the words to introduce its honored guest [Booker T. Washington](#). The poem was set to music soon after by Johnson's brother John in 1905. In 1919, the [National Association for the Advancement of Colored People](#) (NAACP) dubbed it "The Negro National Anthem" for its power in voicing the cry for liberation and affirmation for African-American people.

In 1939, [Augusta Savage](#) received a [commission](#) from the [New York World's Fair](#) and created a 16-foot plaster sculpture called *Lift Every Voice and Sing* which was destroyed by bulldozers at the close of the fair.