Algebra 2
Unit 6 Review: Composition of Functions

Name: KEY
Date: _____ **Period:** _____

Let $f(x) = 2x - 1$, $g(x) = 3x$, and $h(x) = 2x^2 - 3x + 1$. Compute the following:

* 1.) $f(g(-3))$

$g(-3) = 3(-3)$
$g(-3) = -9$
$f(-9) = 2(-9) - 1$
$f(-9) = -18 - 1$
$f(-9) = -19$
$\boxed{f(g(-3)) = -19}$

2.) $f(h(x))$

$= 2(2x^2 - 3x + 1) - 1$
$= 4x^2 - 6x + 2 - 1$
$\boxed{= 4x^2 - 6x + 1}$

* 3.) $g(h(3))$

$h(3) = 2(3)^2 - 3(3) + 1$
$h(3) = 18 - 9 + 1$
$h(3) = 10$
$g(10) = 3(10)$
$g(10) = 30$
$\boxed{g(h(3)) = 30}$

* 4.) $h(f(x))$

$= 2(2x-1)^2 - 3(2x-1) + 1$
$= 2(2x-1)(2x-1) - 3(2x-1) + 1$
$= 2(4x^2 - 4x + 1) - 3(2x-1) + 1$
$= 8x^2 - 8x + 2 - 6x + 3 + 1$
$\boxed{= 8x^2 - 14x + 6}$

5.) $g(f(0))$

$f(0) = 2(0) - 1$
$f(0) = -1$
$g(-1) = 3(-1)$
$g(-1) = -3$
$\boxed{g(f(0)) = -3}$

* 6.) $h(g(-4))$

$g(-4) = 3(-4)$
$g(-4) = -12$
$h(-12) = 2(-12)^2 - 3(-12) + 1$
$h(-12) = 288 + 36 + 1$
$h(-12) = 325$
$\boxed{h(g(-4)) = 325}$

* 7.) $f(2) - 5g(3)$

$f(2) = 2(2) - 1$
$= 4 - 1$
$= 3$

$g(3) = 3(3)$
$= 9$

$= 3 - 5(9)$
$= 3 - 45$
$\boxed{= -42}$

* 8.) $h(g(x-4))$

$g(x-4) = 3(x-4)$
$g(x-4) = 3x - 12$
$h(3x-12) = 2(3x-12)^2 - 3(3x-12) + 1$
$= 2(9x^2 - 72x + 144) - 3(3x-12) + 1$
$= 18x^2 - 144x + 288 - 9x + 36 + 1$
$\boxed{h(g(x-4)) = 18x^2 - 153x + 325}$

9.) $g(x) - f(x) + h(x)$

$= 3x - (2x-1) + 2x^2 - 3x + 1$
$= 3x - 2x + 1 + 2x^2 - 3x + 1$
$\boxed{= 2x^2 - 2x + 2}$

Let $f(x) = 5x + 2$, $g(x) = 4x^2 - 8x + 3$, *and* $h(x) = -3x + 1$. **Compute the following:**

* **10.)** $f(g(-3))$

$g(-3) = 4(-3)^2 - 8(-3) + 3$

$= 36 + 24 + 3$

$= 63$

$F(63) = 5(63) + 2$

$= 315 + 2$

$= 317$

$\boxed{F(g(-3)) = 317}$

11.) $f(h(x))$

$= 5(-3x+1) + 2$

$= -15x + 5 + 2$

$\boxed{= -15x + 7}$

* **12.)** $g(h(3))$

$h(3) = -3(3) + 1$

$= -9 + 1$

$= -8$

$g(-8) = 4(-8)^2 - 8(-8) + 3$

$= 256 + 64 + 3$

$g(-8) = 323$

$\boxed{g(h(3)) = 323}$

13.) $h(f(x))$

$= -3(5x+2) + 1$

$= -15x - 6 + 1$

$\boxed{= -15x - 5}$

* **14.)** $(g - f)(x)$

$g(x) - f(x)$

$4x^2 - 8x + 3 - (5x+2)$

$4x^2 - 8x + 3 - 5x - 2$

$\boxed{4x^2 - 13x + 1}$

15.) $h(g(-4))$

$g(-4) = 4(-4)^2 - 8(-4) + 3$

$= 64 + 32 + 3$

$= 99$

$h(99) = -3(99) + 1$

$= -297 + 1$

$h(99) = -296$

$\boxed{h(g(-4)) = -296}$

* **16.)** $4f(x) - 3h(x+4)$

$4(5x+2) - 3[-3(x+4) + 1]$

$20x + 8 - 3[-3x - 12 + 1]$

$20x + 8 - 3[-3x - 11]$

$20x + 8 + 9x + 33$

$\boxed{29x + 41}$

17.) $h(x) - g(x) + 2f(x)$

$-3x + 1 - (4x^2 - 8x + 3) + 2(5x+2)$

$-3x + 1 - 4x^2 + 8x - 3 + 10x + 4$

$\boxed{-4x^2 + 15x + 2}$

* **18.)** $g(f(x-9))$

$f(x-9) = 5(x-9) + 2$

$f(x-9) = 5x - 45 + 2$

$f(x-9) = 5x - 43$

$g(5x-43) =$

$4(5x-43)^2 - 8(5x-43) + 3$

$4(5x-43)(5x-43) - 8(5x-43) + 3$

$4(25x^2 - 215x - 215x + 1849) - 40x + 344 + 3$

$100x^2 - 860x - 860x + 7396 - 40x + 347$

$100x^2 + 1720x - 40x + 7743$

$\boxed{100x^2 - 1760x + 7743}$