KEY

Name:_____ Date:_____ Period:_____

COMPOSITE FUNCTION WORKSHEET

Directions: Show all work for credit. Work must be neat and answer must be circled.

For 1- 9: Let $f(x) = 2x - 1$, $g(x) = 3x$, and $h(x) = x^2 + 1$. Compute the following:

1. f(g(-3))

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

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

2. f(h(7))

$h(7) = (7)^2 + 1 = 49 + 1 = 50$

$f(50) = 2(50) - 1 = \boxed{99}$

3. (g∘h)(24)

$h(24) = (24)^2 + 1 = 576 + 1 = 577$

$g(577) = 3(577) = \boxed{1,731}$

4. f(g(h(2)))

$h(2) = (2)^2 + 1 = 4 + 1 = 5$

$g(5) = 3(5) = 15$

$f(15) = 2(15) - 1 = \boxed{29}$

5. h(g(f(5)))

$f(5) = 2(5) - 1 = 10 - 1 = 9$

$g(9) = 3(9) = 27$

$h(27) = (27)^2 + 1 = 729 + 1 = \boxed{730}$

6. g(f(h(-6)))

$h(-6) = (-6)^2 + 1 = 36 + 1 = 37$

$f(37) = 2(37) - 1 = 74 - 1 = 73$

$g(73) = 3(73) = \boxed{219}$

7. f(x + 1)

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

$= 2x + 2 - 1$

$= \boxed{2x + 1}$

8. g(3a)

$g(3a) = 3(3a)$

$= \boxed{9a}$

9. h(x – 2)

$h(x-2) = (x-2)^2 + 1$

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

$= x^2 - 2x - 2x + 4 + 1$

$= \boxed{x^2 - 4x + 5}$

For 10-11: Let $f(x) = -3x + 7$ and $g(x) = 2x^2 - 8$. Compute the following:

10. f(g(x)) $= -3(2x^2 - 8) + 7$

$= -6x^2 + 24 + 7$

$= \boxed{-6x^2 + 31}$

11. (g∘f)(x) $= 2(-3x + 7)^2 - 8$

$= 2(-3x+7)(-3x+7) - 8$

$= 2(9x^2 - 21x - 21x + 49) - 8$

$= 2(9x^2 - 42x + 49) - 8$

$= 18x^2 - 84x + 98 - 8$

$= \boxed{18x^2 - 84x + 90}$

12. If $f(x) = 3x - 5$ and $g(x) = x^2$, find $(f \circ g)(3)$

$g(3) = (3)^2 = 9$

$f(9) = 3(9) - 5 = \boxed{22}$

13. If $f(x) = -9x - 9$ and $g(x) = \sqrt{x - 9}$, find $(f \circ g)(10)$

$g(10) = \sqrt{10 - 9} = \sqrt{1} = 1$

$f(1) = -9(1) - 9 = -9 - 9 = \boxed{-18}$

KEY

14. If $f(x)=-4x+2$ and $g(x)=\sqrt{x-8}$, find $(f\circ g)(12)$

$g(12)=\sqrt{12-8}=\sqrt{4}=2$

$f(2)=-4(2)+2=-8+2=\boxed{-6}$

15. If $f(x)=-3x+4$ and $g(x)=x^2$, find $(g\circ f)(-2)$

$f(-2)=-3(-2)+4=6+4=10$

$g(10)=(10)^2=\boxed{100}$

16. If $f(x)=-2x+1$ and $g(x)=\sqrt{x^2-5}$, find $(g\circ f)(2)$

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

$g(-3)=\sqrt{(-3)^2-5}=\sqrt{9-5}=\sqrt{4}=\boxed{2}$

17. Given $f(x)=-9x+3$ and $g(x)=x^4$, find $(f\circ g)(x)$

$f(x^4)=-9(x^4)+3$

$=\boxed{-9x^4+3}$

18. Given $f(x)=2x-5$ and $g(x)=x+2$, find $(f\circ g)(x)$

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

$=2x+4-5$

$=\boxed{2x-1}$

19. Given $f(x)=x^2+7$ and $g(x)=x-3$, find $(f\circ g)(x)$

$f(x-3)=(x-3)^2+7$

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

$=x^2-3x-3x+9+7$

$=\boxed{x^2-6x+16}$

20. Given $f(x)=4x+3$ and $g(x)=x^2$, find $(g\circ f)(x)$

$g(4x+3)=(4x+3)^2$

$=(4x+3)(4x+3)$

$=16x^2+12x+12x+9$

$=\boxed{16x^2+24x+9}$

21. Given $f(x)=x-1$ and $g(x)=x^2+2x-8$, find $(g\circ f)(x)$

$g(x-1)=(x-1)^2+2(x-1)-8$

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

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

$=\boxed{x^2-9}$