Name:_____ Date:_____ Period:_____ $g \circ h$

$g(h(x))$

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) = x² + 1. Compute the following: |

1. f(g(-3)) $= -19$

Plug -3 into g
Plus Answer into f
$g(-3) = 3(-3) = -9$
$f(-9) = 2(-9) - 1$

2. f(h(7)) $= 99$

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

$f(50) = 2(50) - 1$

3. (g∘h)(24) $h(24) = 577$

$g(h(24))$

$g(577) = 3(577)$

1731

4. f(g(h(2))) $= 29$

$h(2) = 5$

$g(5) = 15$

$f(15) =$

5. h(g(f(5))) $= 730$

$f(5) = 9$

$g(9) = 27$

$h(27) =$

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

$h(-6) = 37$

$f(37) = 73$

$g(73) = 219$

$\rightarrow x^2 + 1 \quad (x+1)^2$

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

$2x + 2 - 1$

$2x + 1$

8. g(3a) $= 3(3a)$

$= 9a$

9. h(x – 2) $= (x-2)^2 + 1$

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

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

$x^2 - 4x + 5$

| For 10-11: Let f(x) = -3x + 7 and g(x) = 2x² – 8. Compute the following: |

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

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

$-6x^2 + 24 + 7$

$-6x^2 + 31$

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

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

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

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

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

$18x^2 - 84x + 90$

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

$f(g(x)) = 3x - 5$

$f(x^2) = 3(x^2) - 5$

$f(g(3)) = 3(3^2) - 5$

$= 22$

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

$f(g(x)) = -9x - 9$

$f(\sqrt{x-9}) = -9(\sqrt{x-9}) - 9$

$(f \circ g)(10) = -18$

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

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

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

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

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

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

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

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

Verifying Inverses
Verify that *f* and *g* are inverse functions.

$f(g(x)) = g(f(x))$

$x = x$

19. $f(x) = x + 6, \ g(x) = x - 6$

20. $f(x) = 5x + 2, \ g(x) = \dfrac{x - 2}{5}$

21. $f(x) = -3x - 9, \ g(x) = -\dfrac{1}{3}x - 3$

22. $f(x) = 2x - 7, \ g(x) = \dfrac{x + 7}{2}$

23. $f(x) = -4x + 8, \ g(x) = -\dfrac{1}{4}x + 2$

24. $f(x) = \dfrac{1}{2}x - 7, \ g(x) = 2x + 14$

20)

$$f(x) = 5x + 2 \qquad g(x) = \frac{x-2}{5}$$

$$f(g(x)) = 5x + 2 \qquad\qquad g(f(x)) = \frac{x-2}{5}$$

$$f\left(\frac{x-2}{5}\right) = 5\left(\frac{x-2}{5}\right) + 2 \qquad\qquad g(5x+2) = \frac{5x+2-2}{5}$$

$$x - 2 + 2 \qquad\qquad\qquad = \frac{5x}{5} = x$$

$$x$$

21) $f(x) = -3x - 9$ $g(x) = -\frac{1}{3}x - 3$

$f(g(x)) = -3x - 9$ $g(f(x)) = -\frac{1}{3}x - 3$

$f\left(-\frac{1}{3}x - 3\right) = -3\left(-\frac{1}{3}x - 3\right) - 9$ $g(-3x - 9) = -\frac{1}{3}(-3x - 9) - 3$

$\quad\quad = x + 9 - 9$ $\quad\quad\quad x + 3 - 3$

$\quad\quad = x$ $\quad\quad\quad x$

$$\frac{\dfrac{2x+6}{x-2} + \dfrac{3(x-2)}{x-2}}{\dfrac{x+3}{x-2} - \dfrac{x-2}{x-2}} = \frac{\dfrac{2x+6}{x-2} + \dfrac{3x-6}{x-2}}{\dfrac{x+3}{x-2} - \dfrac{x-2}{x-2}} \qquad = \frac{\dfrac{5x}{x-2}}{\dfrac{5}{x-2}}$$

$$\frac{5x}{x-2} \cdot \frac{x-2}{5}$$

$$x$$