Name: _____ Class: _____ Date: _____ ID: A

Lesson #8: Understanding and Performing Compositions of Functions
(Reference: Lesson #53 in book)

Problem

1. **Evaluate the composite function for each of the following, given the different functions.**

   1. If $f(x) = 3x - 5$ and $g(x) = x^2$, find $f(g(4))$ or $(f \circ g)(4)$ and $g(f(5))$ or $(g \circ f)(5)$.

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

3. If $f(x) = 4x - 3$ and $g(x) = \sqrt{x - 8}$, find $f(g(12))$ or $(f \circ g)(12)$ and $g(f(9))$ or $(g \circ f)(9)$.

4. If $f(x) = -6x^2 + 30$ and $g(x) = \sqrt{3x - 9}$, find $f(g(6))$ or $(f \circ g)(6)$ and $g(f(2))$ or $(g \circ f)(2)$.

5. If $f(x) = -2x + 1$ and $g(x) = \sqrt{x^2 - 13}$, find $f(g(7))$ or $(f \circ g)(7)$ and $g(f(-3))$ or $(g \circ f)(-3)$.

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

7. If $f(x) = x^3 - x + 1$ and $g(x) = 2x^2$ and $h(x) = \sqrt{x}$, find $f(g(h(9)))$ or $(f \circ g \circ h)(9)$.

8. **Find the composite function for each of the following, given the different functions and find the domain of each of the resultant functions.**

   8. Let $f(x) = 4x - 6$ and $g(x) = 3x$. Find the composite function $f(g(x))$ or $(f \circ g)(x)$ and $g(f(x))$ or $(g \circ f)(x)$.

9. Let $f(x) = x^2 - 4x$ and $g(x) = 2x$. Find the composite function $f(g(x))$ or $(f \circ g)(x)$ and $g(f(x))$ or $(g \circ f)(x)$.

10. Let $f(x) = 3x + 5$ and $g(x) = x^2$. Find the composite function $g(f(x))$ or $(g \circ f)(x)$ and $f(g(x))$ or $(f \circ g)(x)$.

11. Let $f(x) = 2x - 1$ and $g(x) = x^2 + 1$. Find the composite function $g(f(x))$ or $(g \circ f)(x)$ and $f(g(x))$ or $(f \circ g)(x)$.

12. Let $f(x) = 2x^2 + 7$ and $g(x) = 3x - 3$. Find the composite function $g(f(x))$ or $(g \circ f)(x)$ and $f(g(x))$ or $(f \circ g)(x)$.

13. Let $f(x) = 3x^2 + 4$ and $g(x) = x^2 - 5$. Find the composite function $g(f(x))$ or $(g \circ f)(x)$ and $f(g(x))$ or $(f \circ g)(x)$.

14. Let $f(x) = 2x - 5$ and $g(x) = x^2 + 2x - 8$. Find the composite function $g(f(x))$ or $(g \circ f)(x)$ and $f(g(x))$ or $(f \circ g)(x)$.

15. Let $f(x) = 4x^2 + 3$ and $g(x) = x^3 + 8$. Find the composite function $g(f(x))$ or $(g \circ f)(x)$ and $f(g(x))$ or $(f \circ g)(x)$.

16. Let $f(x) = -2x$ and $g(x) = 4x - 5$ and $h(x) = x^2$. Find the composite function $h(g(f(x)))$ or $(h \circ g \circ f)(x)$ and $g(h(f(x)))$ or $(g \circ h \circ f)(x)$.

17. Let $f(x) = 2x - 1$ and $g(x) = 3x$ and $h(x) = x^2 + 1$. Find the composite function $h(g(f(x)))$ or $(h \circ g \circ f)(x)$ and $f(g(h(x)))$ or $(f \circ g \circ h)(x)$.

18. Let $f(x) = 9 - x$ and $g(x) = x^2 + x$ and $h(x) = x - 2$. Find the composite function $h(g(f(x)))$ or $(h \circ g \circ f)(x)$ and $f(g(h(x)))$ or $(f \circ g \circ h)(x)$.

19. Let $f(x) = x^3 - 5x^2$ and $g(x) = 2x - 3$ and $h(x) = x + 4$. Find the composite function $h(g(f(x)))$ or $(h \circ g \circ f)(x)$ and $f(g(h(x)))$ or $(f \circ g \circ h)(x)$.

20. Let $f(x) = 2(x - 1)$ and $g(x) = x^2$ and $h(x) = \sqrt{3x + 2}$. Find the composite function $h(g(f(x)))$ or $(h \circ g \circ f)(x)$ and $f(g(h(x)))$ or $(f \circ g \circ h)(x)$.