DATE: ____________

1.4 Function Operation Practice

If $f(x) = x - 3$ and $g(x) = \sqrt{x}$, state the domain of $f(x)$ and $g(x)$. Then, find and state the domain of $(f \circ g)(x)$ and $(g \circ f)(x)$. Finally, find $(f \circ g)(9)$ and $(g \circ f)(15)$.

Domain of $f(x)$: $(-\infty, \infty)$
Domain of $g(x)$: $[0, \infty)$

$(f \circ g)(x)$

$(f \circ g)(x) = f(g(x))$
$= \sqrt{x} - 3$

Domain: $[0, \infty)$

$(g \circ f)(x)$

$(g \circ f)(x) = g(f(x))$
$= \sqrt{x-3}$

can't $\sqrt{\ }$ neg #s,
so $x - 3 \geq 0$
$x \geq 3$

Domain: $[3, \infty)$

$(f \circ g)(9) = \sqrt{9} - 3 = 3 - 3 = 0$

$(g \circ f)(15) = \sqrt{15 - 3} = \sqrt{12} = \sqrt{4} \cdot \sqrt{3} = 2\sqrt{3}$

If $f(x) = 2x^2$ and $g(x) = x^2 - 4$, state the domain of $f(x)$ and $g(x)$. Then, find and state the domain of each:

If $f(x) = 2x^2$ and $g(x) = x^2 - 4$, state the domain of $f(x)$ and $g(x)$. Then, find and state the domain of each:

Domain of $f(x)$: $(-\infty, \infty)$
Domain of $g(x)$: $(-\infty, \infty)$

$(f + g)(x)$

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

Domain: $(-\infty, \infty)$

$(f - g)(x)$

$(f-g)(x) = 2x^2 - (x^2 - 4)$
$= 2x^2 - x^2 + 4$
$= x^2 + 4$

Domain: $(-\infty, \infty)$

$(fg)(x)$

$(fg)(x) = (2x^2)(x^2 - 4)$
$= 2x^4 - 8x^2$

Domain: $(-\infty, \infty)$

$(f/g)(x)$

$\left(\frac{f}{g}\right)(x) = \frac{2x^2}{x^2 - 4}$

can't divide by zero
$x^2 - 4 \neq 0$
$(x-2)(x+2) \neq 0$
$x - 2 \neq 0 \quad x + 2 \neq 0$
$x \neq 2 \quad x \neq -2$

Domain: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

$(f \circ g)(x)$

$(f \circ g)(x) = f(g(x))$
$= 2(x^2 - 4)^2$
$= 2(x^2 - 4)(x^2 - 4)$
$= 2(x^4 - 8x^2 + 16)$
$= 2x^4 - 16x^2 - 32$

Domain: $(-\infty, \infty)$

$(g \circ f)(x)$

$(g \circ f)(x) = g(f(x))$
$= (2x^2)^2 - 4$
$= 4x^4 - 4$

Domain: $(-\infty, \infty)$