Name Key

Algebra 2:
5.5 Function Operations WS

For problems 1-2, write the rules for the given functions, simplify as much as possible, and state its domain.

1. $f(x)=2x^2-9x+4$ and $g(x)=2x-1$

a. $(f+g)(x)$

$=2x^2-9x+4+2x-1$

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

D: $x\in\mathbb{R}$

b. $(f-g)(x)$

$=2x^2-9x+4-(2x-1)$

$=2x^2-11x+5$

D: $x\in\mathbb{R}$

c. $(f\cdot g)(x)$

$=(2x^2-9x+4)(2x-1)$

$=4x^3-2x^2-18x^2+9x+8x-4$

$=4x^3-20x^2+17x-4$

D: $x\in\mathbb{R}$

d. $\left(\frac{g}{f}\right)(x)$

$=\frac{2x-1}{2x^2-9x+4}=\frac{2x-1}{(2x-1)(x-4)}$

$=\frac{1}{x-4};\ x\neq\frac{1}{2}$ D: $x\in\mathbb{R}$; $x\neq\frac{1}{2}$, $x\neq 4$

2. $m(x)=\sqrt[3]{3x}$ and $n(x)=2\sqrt[3]{3x}$

a. $(m+n)(x)$

$=\sqrt[3]{3x}+2\sqrt[3]{3x}$

$=3\sqrt[3]{3x}$

D: $x\in\mathbb{R}$

b. $(m-n)(x)$

$=\sqrt[3]{3x}-2\sqrt[3]{3x}$

$=-1\sqrt[3]{3x}$

D: $x\in\mathbb{R}$

c. $(m\cdot n)(x)$

$=\sqrt[3]{3x}\cdot 2\sqrt[3]{3x}=2\sqrt[3]{9x^2}$

D: $x\in\mathbb{R}$

d. $\left(\frac{m}{n}\right)(x)$

$=\frac{\sqrt[3]{3x}}{2\sqrt[3]{3x}}=\frac{1}{2};\ x\neq 0$

D: $x\in\mathbb{R}$; $x\neq 0$

3. Smapple is selling their new s-phones. The demand for the s-phone is predicted by the function $d(x)=0.72x^2+460$. Smapple plans to charge a variable price based on the function $p(x)=x+16$. In both equations x is the cost of producing each s-phone. *Calculator allowed.*

a. Find and simplify an equation for Smapple's revenue. *Hint:* Revenue = Demand · Price

$R(x)=(0.72x^2+460)(x+16)$

$=0.72x^3+11.52x^2+460x+7360$

b. Use your equation from **part a** to find Smapple's revenue if the cost of producing each s-phone is \$100.

$R(100)=\$888{,}560$

D: $x \in (-\infty, 3]$ D: $x \in \mathbb{R}$

For problems 4-5: Let $f(x) = \sqrt{3-x}$ and $g(x) = 3 - 4x^2$. Simplify each rule as much as possible.

4. $(f \circ g)(x) = \sqrt{3-(3-4x^2)}$

$= \sqrt{4x^2}$

$= 2|x|$

a. Domain of $(f \circ g)(x)$: $x \in \mathbb{R}$

$3 - 4x^2 \leq 3$

$x^2 \geq 0$

always true!

b. $(f \circ g)(-2) =$

$= 2|-2|$

$= 4$

5. $(g \circ f)(x) = 3 - 4(\sqrt{3-x})^2$

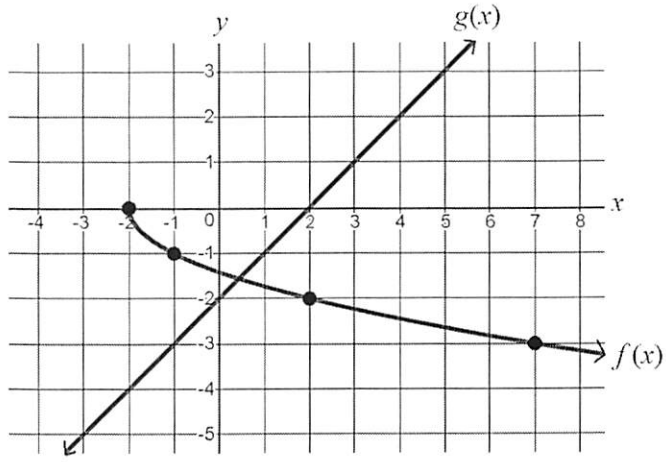
$= 3 - 4(3-x) = 4x - 9$

a. Domain of $(g \circ f)(x)$: $x \in (-\infty, 3]$

b. $(g \circ f)(4) =$

DNE, because 4 outside of domain

6. Use the graphs of $f(x)$ and $g(x)$, shown to the right, to find each value.



a. $(f+g)(-2) = 0 + -4 = -4$

$f(-2) + g(-2)$

b. $\left(\frac{g}{f}\right)(2) = \frac{0}{-2} = 0$

$\frac{g(2)}{f(2)}$

c. $(f \cdot g)(7) = -3 \cdot 5 = -15$

$f(7) \cdot g(7)$

d. $(g \circ f)(2) = g(-2) = -4$

$g(f(2))$, $f(2) = -2$

7. Use the graph of $h(x)$, the table of selected values of $f(x)$, and the equation for $g(x)$ to find the indicated values.

a. $h(g(1)) = h(1) = 5$

$g(1) = 1$

b. $f(h(4)) = f(7) = 3$

$h(4) = 7$

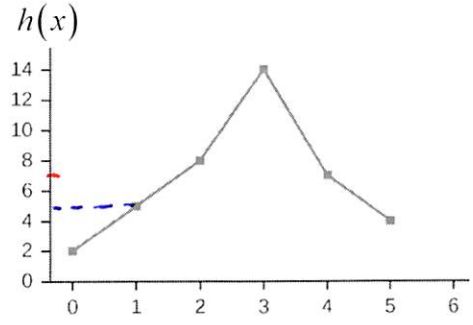
c. $g(h(f(3))) = g(h(5)) = g(4) = 100$

$f(3) = 5$, $h(5) = 4$

d. $f(f(6)) = f(-4) = 9$

$f(6) = -4$

x	$f(x)$
−4	9
−2	7
0	−5
3	5
6	−4
7	3
8	−10



$g(x) = (3x-2)^2$