Accel. Geom/Alg. II
Unit 5 Test Review

Name Key
Date _____ Period _____

1. Consider the following functions.

$f(x) = 6x - 2$ $g(x) = 3x$ $h(x) = 2^x + 3$ $p(x) = 2$

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

$9x - 2$

b. Determine $(f + h)(x)$

$6x + 2^x + 1$

c. Determine $(g - f)(x)$

$-3x + 2$

d. Determine $(p \cdot g)(x)$

$6x$

e. Determine $(f \cdot g)(2)$

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

$2 - \frac{2}{3x}$

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2. Given the following partial set of values of function evaluate the following.

x	−1	0	1	2	3
f(x)	1	2	4	8	16
g(x)	−5	−3	−1	1	3

a. Determine $f(1) - 2 \cdot g(2)$

$4 - (2)(1)$
$= 2$

b. Determine $(f + g)(2)$

$f(2) + g(2)$
$8 + 1 = 9$

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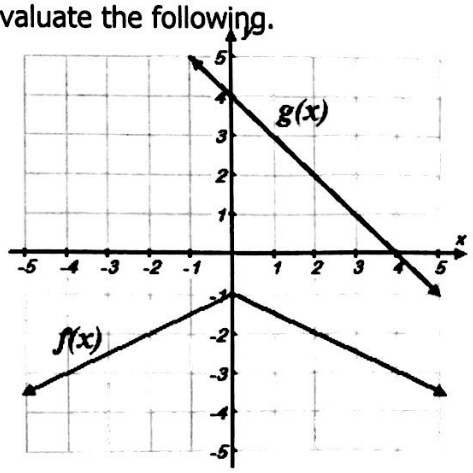
3. Given the following partial set of values of function evaluate the following.

a. Determine $f(4) + 2 \cdot g(1)$

$-3 + (2)(3)$

$= 3$



4. Consider the following functions.

$f(x) = 6x - 2$	$g(x) = 3x$	$h(x) = 2^x + 3$	$p(x) = 2$

a. Determine $(f \circ h)(1)$

$= f(h(1))$

$= f(5)$

$= 28$

b. Determine $(g \circ f)(2)$

$= g(f(x))$

$= g(10)$

$= 30$

c. Determine $(f \circ g)(x)$

$f(g(x))$

$= 6(3x) - 2$

$= 18x - 2$

d. Determine $(g \circ h)(x)$

$g(h(x))$

$= 3(2^x + 3)$

$= 3 \cdot 2^x + 9$

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5. Given the following partial set of values of function evaluate the following.

x	−1	0	1	2	3
$f(x)$	1	2	4	8	16
$g(x)$	−5	−3	−1	1	3

a. Determine $(f \circ g)(2)$

$f(g(2)) = f(1)$

$= 4$

b. Determine $(g \circ f)(0)$

$g(f(0)) = g(2) = 1$

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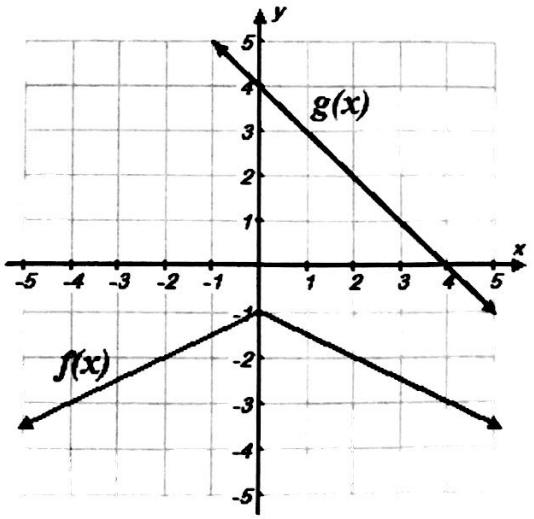
6. Given the following partial set of values of function evaluate the following.

a. Determine $(f \circ g)(0)$

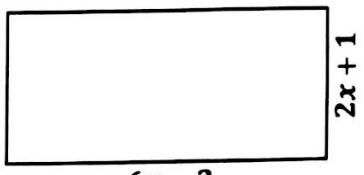
$= f(g(0))$

$= f(4)$

$= -3$



7. The **length** of a rectangle can be described by the function $f(x) = 6x - 2$ and the **width** of the same rectangle can be described by $g(x) = 2x + 1$



a. Determine $(f \cdot g)(x)$ and explain what it represents.

$(6x-2)(2x+1) = 12x^2 + 2x - 2$

This function represents the area of the rectangle

b. Determine an expression that represents the perimeter of the rectangle.

$2(6x-2) + 2(2x+1)$

$= 12x - 4 + 4x + 2 = 16x - 2$

8. Simplify each composition completely.

Given: $f(x) = 10 - x^2$ $\quad g(x) = \dfrac{3}{x+1}$ $\quad h(x) = x - 3$

a. $f(h(x))$

$= 10 - (x-3)^2$

$= 10 - (x^2 - 6x + 9)$

$= -x^2 + 6x + 1$

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

$g(10 - x^2 - 3) = g(7 - x^2)$

$= \dfrac{3}{7 - x^2 + 1} = \dfrac{3}{8 - x^2}$

9. Verify which of the following are inverses of one another by considering $f(g(x))$ and $g(f(x))$

a. $f(x) = 4x$, $g(x) = \dfrac{x}{4}$

$f(g(x)) = 4\left(\dfrac{x}{4}\right) = x$

$g(f(x)) = \dfrac{4x}{4} = x$

They are inverses

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

$f(g(x)) = 2\left(\dfrac{x-1}{2}\right) + 1 = x$

$g(f(x)) = \dfrac{2x + 1 - 1}{2} = x$

They are inverses

c. $f(x) = \dfrac{x}{2} - 3$, $g(x) = 2x + 3$

$f(g(x)) = \dfrac{2x+3}{2} - 3$

$= \dfrac{2x}{2} + \dfrac{3}{2} - 3$

$= x - \dfrac{3}{2}$

$g(f(x))$

They are not inverses

d. $f(x) = 2x^3 - 1$, $g(x) = \sqrt[3]{\dfrac{x+1}{2}}$

$f(g(x)) = 2\left(\sqrt[3]{\dfrac{x+1}{2}}\right)^3 - 1$

$= 2\left(\dfrac{x+1}{2}\right) - 1$

$= x$

$g(f(x)) = \sqrt[3]{\dfrac{(2x^3 - 1) + 1}{2}}$

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

$= x$

They are inverses

10. Find the inverse relation.

a. $f(x) = \dfrac{(x-2)^6}{5} - 9$

$x = \dfrac{(y-2)^6}{5} - 9$

$\sqrt[6]{5(x+9)} = \sqrt[6]{(y-2)^6}$

$\sqrt[6]{5(x+9)} + 2 = y$

b. $g(x) = \dfrac{4}{5-x^3}$

$(5-y^3)\,x = \dfrac{4}{5-y^3}\cdot(5-y^3)$

$(5-y^3)(x) = \dfrac{4}{x}$

$5 - y^3 = \dfrac{4}{x}$

$-y^3 = \dfrac{4}{x} - 5$

$y^3 = -\dfrac{4}{x} + 5$

$y = \sqrt[3]{-4/x + 5}$

11. The shoe size for the average U.S. teen or adult male can be modeled by the function M(x) = 3x-22 where x is the length of the foot in inches.

a. Find the inverse of the function above.

$x = 3y - 22$

$\dfrac{x+22}{3} = y$

b. Explain in words what the inverse function represents.

The inverse function will give you someone's foot length given their shoe size

12. Divide using long division.

a. $(9x^4 + 30x^3 - 15x - 9) \div (x^2 + 3x)$

$9x^2 + 3x - 9 + \dfrac{12x-9}{x^2+3x}$

$x^2+3x+0 \;\big)\; 9x^4 + 30x^3 + 0x^2 - 15x - 9$

$-(9x^4 + 27x^3 + 0x^2)$

$3x^3 + 0x^2 - 15x$

$-(3x^3 + 9x^2 + 0x)$

$-9x^2 - 15x - 9$

$-(-9x^2 - 27x - 0)$

$12x - 9$

b. $(3x^3 - 17x^2 + 21x + 25) \div (x^2 - 2x - 3)$

$3x - 11 + \dfrac{8x-8}{x^2-2x-3}$

$x^2-2x-3 \;\big)\; 3x^3 - 17x^2 + 21x + 25$

$-(3x^3 - 6x^2 - 9x)$

$-11x^2 + 30x + 25$

$-(-11x^2 + 22x + 33)$

$8x - 8$

13. Divide using synthetic division.

a. $(x^4 - 9x^3 + 16x^2 + 8x + 18) \div (x - 6)$

6	1	-9	16	8	18
		6	-18	-12	-24
	1	-3	-2	-4	-6

$x^3 - 3x^2 - 2x - 4 - \dfrac{6}{x-6}$

b. $(7x^4 - 6x^2 + 6x - 5) \div (x + 1)$

-1	7	0	-6	6	-5
		-7	7	-1	-5
	7	-7	1	5	-10

$7x^3 - 7x^2 + x - 5 - \dfrac{10}{x+1}$

14. Factor completely.

a. $2x^3 + 16$

$2(x^3 + 8) = 2(x^3 + 2^3)$

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

b. $27x^3 - 64 = (3x)^3 - (4)^3$

$= (3x-4)(9x^2 + 12x + 16)$