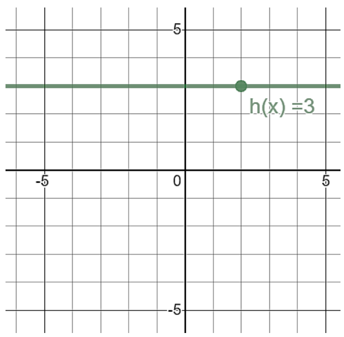
Name:____ Per: _______

Combinations and Composition of Functions Investigation

1. $h(x) = (f + g)(x)$ and $h(x)$ is graphed below. Come up with equations for $f(x)$ *and* $g(x)$ that would produce $h(x)$, then sketch, and label, the graphs in. Note, neither can be equations with a slope of 0.

$f(x) =$ ____________________________

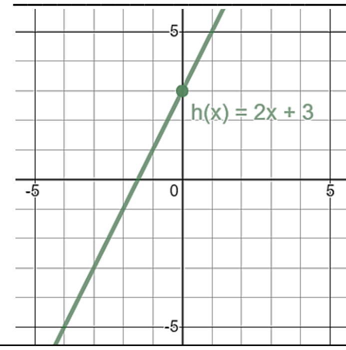
$g(x) =$ ____________________________



2. $h(x) = (f + g)(x)$ and $h(x)$ is graphed below. Come up with equations for $f(x)$ *and* $g(x)$ that would produce $h(x)$, then sketch, and label, the graphs in. Note, neither can be equations with a slope of 0.

$f(x) =$ ____________________________

$g(x) =$ ____________________________



3. Verify your work to problem 1 above by filling in the tables below.

x	-2	-1	0	1	2
f(x)					

x	-2	-1	0	1	2
g(x)					

x	-2	-1	0	1	2
h(x)					

4. Verify your work to problem 2 above by filling in the tables below.

x	-2	-1	0	1	2
f(x)					

x	-2	-1	0	1	2
g(x)					

x	-2	-1	0	1	2
h(x)					

5. $h(x) = (fg)(x)$ and $h(x) = x^2 + 4x - 12$. Come up with equations for $f(x)$ *and* $g(x)$ that would produce $h(x)$. Note, each equation must contain a variable.

$f(x) =$ ____________________________

$g(x) =$ ____________________________

6. $h(x) = (f/g)(x)$ and $h(x) = \frac{1}{x-7}$. Come up with equations for $f(x)$ *and* $g(x)$ that would produce $h(x)$. Note, each equation must contain a variable.

$f(x) =$ ____________________________

$g(x) =$ ____________________________

7. $h(x) = (f - g)(x)$ and $h(2) = 20$. Come up with equations for $f(x)$ *and* $g(x)$ that would produce $h(x)$. Note, one equation must be of degree 3 and the other degree 2.

$f(x) =$ ____________________________

$g(x) =$ ____________________________

8. $h(x) = (fg)(x)$ and $h(4) = 100$. Come up with equations for $f(x)$ *and* $g(x)$ that would produce $h(x)$. Note, one equation must be of degree 2 and the other degree 1.

$f(x) =$ ____________________________

$g(x) =$ ____________________________

9. $k(x) = f(g(x))$ and $k(x) = (x-3)^2$. Come up with equations for $f(x)$ and $g(x)$ that would produce $k(x)$.

$f(x) =$ ______________________________

$g(x) =$ ______________________________

10. $k(x) = f(g(x))$ and $k(x) = \sqrt{x+4} + 5$. Come up with equations for $f(x)$ and $g(x)$ that would produce $k(x)$.

$f(x) =$ ______________________________

$g(x) =$ ______________________________

11. $k(x) = f(g(x))$ and $k(6) = 10$. Come up with equations for $f(x)$ and $g(x)$ that would produce $k(x)$. Note, one of the equations must have degree 2.

$f(x) =$ ______________________________

$g(x) =$ ______________________________

12. $k(x) = f(g(x))$ and $k(-4) = 10$. Come up with equations for $f(x)$ and $g(x)$ that would produce $k(x)$. Note, one of the equations must have degree 2.

$f(x) =$ ______________________________

$g(x) =$ ______________________________

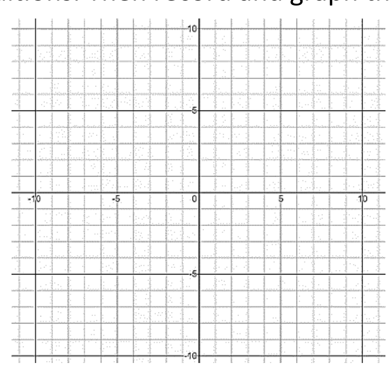
13. In chemistry, one regular conducts mole conversions to convert grams of a substance to number of atoms. It turns out this process is just a composition of functions.
For chlorine, to convert from moles to atoms, you use the following function: $a(m) = m(6.02 \cdot 10^{23})$
For chlorine, to convert from grams to moles, you use the following function: $m(g) = \frac{g}{35.5}$

i) Simplify the following to get a function that takes you directly from grams to atoms:
$a(m(g))$ =

ii) Use your finding from part (i) to determine how many atoms are in 83 grams of chlorine.

14. Find equations for $f(x)$ and $g(x)$ that satisfy the following conditions. Then record and graph them.

- $f(g(x)) = x$
- $g(f(x)) = x$
- Both equations are linear
- $f(x)$ has a negative slope
- $g(x)$ has a negative y-intercept



$f(x) =$ ______________________________

$g(x) =$ ______________________________

15. Fill in a table of points for each function and record what you notice.

x					
f(x)					

x					
g(x)					

Noticing: