Name $\qquad$
Date

1. Given the following functions: $f(x)=x+2, g(x)=\frac{1}{x}$, and $h(x)=x^{2}-x-2$. Find and simplify your answers:

$$
\begin{aligned}
& a .(f+g)(x) \\
& b .\left(\frac{f}{g}\right)(x) \\
& \text { c. }(g \cdot h)(x) \\
& \text { d. }(f \circ h)(x)
\end{aligned}
$$

2. Each of the following is a composition of functions $f(g(x))$. Fill in the grid below.

| $\boldsymbol{f ( g ( x ) )}$ | $\boldsymbol{f}(x)$ | $\boldsymbol{g}(\boldsymbol{x})$ | Domain of <br> $\boldsymbol{f ( g ( x ) )}$ | Domain of $\boldsymbol{f}$ | Domain of $\boldsymbol{g}$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| a. $\sqrt{3 x+2}$ |  |  |  |  |  |
| b. $\left(\frac{x+1}{x-2}\right)^{3}$ |  |  |  |  |  |
| c. $(\|x\|)^{3}$ |  |  |  |  |  |
| $\left(\frac{1}{\sqrt{9-x^{2}}}\right)^{2}$ |  |  |  |  |  |
| e. $\sqrt{\frac{x+1}{x-5}}$ |  |  |  |  |  |

3. Given the table:

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $f(x)$ | 10 | 6 | 3 | 4 | 7 | 11 |
| $g(x)$ | -3 | -1 | 0 | 1 | 3 | 5 |

Find:
a) $3 f(x)$
b) $2-f(x)$
c) $f(x)-g(x)$
4. In each of the problems below the order in which the transformations are to be applied to the graph is specified. In each case, sketch the graph and write an equation for the transformed graph.
a) $y=x^{2}$, vertical stretch by a factor of 3 , then a shift up by 4
b) $y=|x|$, shift left 3 , vertical shrink by $1 / 2$, shift down 4
c) $y=\sqrt{x}$, vertical stretch by 2 , reflect through $x$-axis, shift left 5 , shift down 2

## Unit 1, Activity 4, Operations on Functions

5. Suppose a store sells calculators by marking up the price $20 \%$. The price, then, of one calculator costing c dollars is $p(c)=c+0.2 c$. The cost of manufacturing $n$ calculators is $50 n+200$ dollars. Thus the cost of each calculator is $c(n)=\frac{50 n+200}{n}$
a) Find the price for one calculator if only one calculator is manufactured.
b) Find the price for one calculator if 1000 calculators are manufactured.
c) Express the price as a function of the number of calculators produced by finding $p(c(n))$.
d) Sketch a graph of the resulting function.
6. Writing activity: What can be said about the composition of an even function with an odd function? Using several even and odd functions, investigate their composition both algebraically and graphically. Show your work and write a paragraph summarizing what you found.
