Advanced Algebra 3/4 Name:____________

Intro to Inverses

AA3: I can find the inverse of a function and represent and describe the relationship using tables, graphs, equations and domain and range.

Definition: The inverse of a function is the opposite of a function. The inverse undoes the operations of the function. Order is very important (think PEMDAS vs SADMEP).

If a function is called f (x), then the inverse is written $f^{-1}(x)$

I. Use the definition of inverse to fill in the following tables. Then write rules for f(x) and $f^{-1}(x)$.

a.

f(x)	**Add 5**	**Multiply by 3**
$f^{-1}(x)$		

Rules:
f(x) = **$f^{-1}(x)$ =**

b.

f(x)	**Divide by 2**	**Minus 1**	**Multiply by -6**
$f^{-1}(x)$			

Rules:
f(x) = **$f^{-1}(x)$ =**

c.

f(x)	**Minus 1**	**Divide by 3**	**Minus 2**	**Divide by 4**
$f^{-1}(x)$				

Rules:
f(x) = **$f^{-1}(x)$ =**

Please notice that when you invert a function, BOTH the order and the operations are reversed. It's not enough to just switch the operations. You also have to switch the order. It should feel like solving an equation.

II. Use the rule for f(x) to fill in the operations tables and then write a rule for $f^{-1}(x)$

a. **$f(x) = 3(x - 4)$**

f(x)		
$f^{-1}(x)$		

$f^{-1}(x) =$

b. **$f(x) = -2(3x + 4)$**

f(x)			
$f^{-1}(x)$			

$f^{-1}(x) =$

c. **$f(x) = \frac{1}{2} (x - 4)^3 + 1$**

f(x)				
$f^{-1}(x)$				

$f^{-1}(x) =$

Please notice that numbers and operations switch places when you write the inverse of a function. If a number was inside of the parentheses in the original function, it will be outside the parentheses in the inverse. If a number was outside for the function, it will be inside the inverse.

III. Reflection Questions

a. **Why do you have to change the order of operations as well as the operations themselves?**

b. **Do all functions have inverses? If yes, explain why. If no, give an example.**