

**Algebra II**  
**Lesson 6: Inverse Functions**  
**Mrs. Snow, Instructor**

Many actions are reversible. A light can be turned on; reverse this action and the light is turned off. In mathematics this concept of reversing a calculation and arriving at the original result is associated with an inverse. A function can be described as a “DO” and the inverse can be described as the “UNDO.” Put another way, an inverse relation is an exact opposite of what a function does and has a special symbol;  $f^{-1}(x)$ .

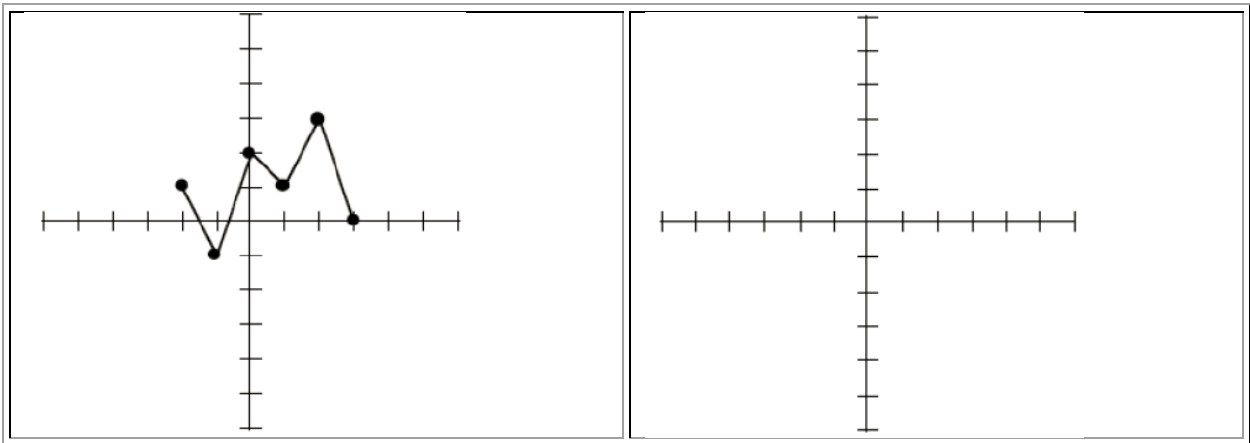
**Graphing inverse functions**

**DOMAIN AND RANGE**

The domain of  $f$  equals the range of  $f^{-1}$ . The range of  $f$  equals the domain of  $f^{-1}$ . OH!! So when given a table of values or even a graph, to find the inverse switch the  $x$  and  $y$  values! When you are required to plot an inverse, remember, the inverse of a function has the same number of points as the original function, except that the  $x$ 's and  $y$ 's have been switched.

Using a table of values, graph the inverse of each graph:

<p><b>a.</b></p>	<p><b>b.</b></p>



Is the inverse a function? Why or why not?

Evaluate each of the following:

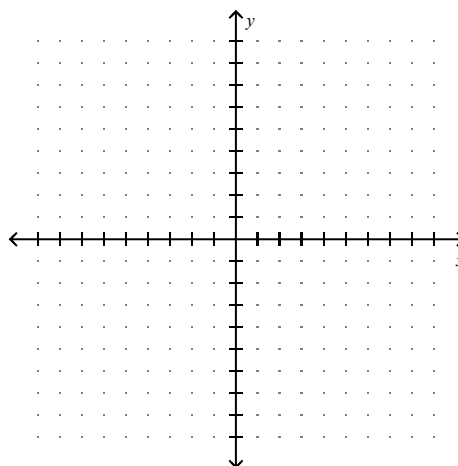
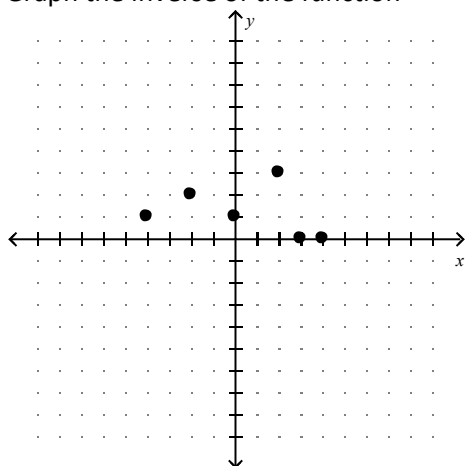
a. $f(2)$	b. $f^{-1}(2)$
c. $f^{-1}(0)$	d. $f(5) - f^{-1}(5)$

For each of the following functions – 1) find the inverse, 2) find the domain and range of the inverse, 3) determine whether the inverse is a function, and 4) then evaluate (if given) for  $f^{-1}(-1)$ ,  $f(2)$ , and  $f^{-1}(3)$ .

$x$	$f(x)$
-2	1
-1	0
0	-1
1	-3
2	-5

$p$	$f(p)$
-3	3
-2	6
1	3
2	0
3	-9

Graph the inverse of the function



### Inverse of a function equation

There are 2 basic steps to formulating an inverse relation.

- Step 1            Switch the x and y in the equation
- Step 2            Solve for the new "y", and replace y with  $f^{-1}(x)$
- 

<p>Find the inverse function for</p> $f(x) = \frac{1}{3}x - 2$	$f(t) = 8(t + 4)$
$g(x) = 2x + 5$	$h(x) = \frac{x - 4}{2}$

**Determine whether or not functions are inverses of each other**

$f(x)$  and  $g(x)$  are inverses if and only if:

$$f(g(x)) = g(f(x)) = x$$

Determine whether the following functions are inverses of each other.

$$f(x) = 3x - 2, \quad g(x) = \frac{x + 2}{3}$$

$$h(x) = \frac{1}{4}x + 2, \quad k(x) = 4x - 2$$