In Canada, the unit of currency is the *Canadian dollar*. This dollar does not have the same value as the US dollar (known as USD). Most often, the Canadian dollar is worth less than 1 USD. This means that if you travel to Canada and see prices, the prices will seem higher than prices in the US. Below is a conversion chart from USD to Canadian dollar (the conversion rate changes daily; this is 12/5/12's rate).

Price in USD	**Price in Canadian Dollar** $\boldsymbol{C = 1.007U}$
0	
15	
30	
50	
60	
100	

In this table, the left column is the *input* and has a domain of

The right column is the *output* and has a range of

The function that relates the two quantities is $C = 1.007U$

But if you were in Canada, you may want to relate the Canadian price to the US price. You would switch the domain and range of the function. The Canadian price would become the input and the US price would become the output, creating a table that looks like below.

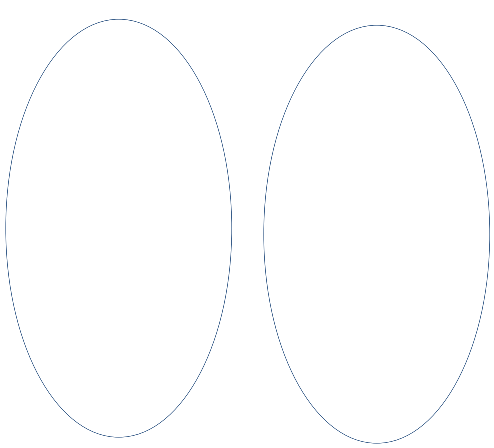
What is the equation for this table?

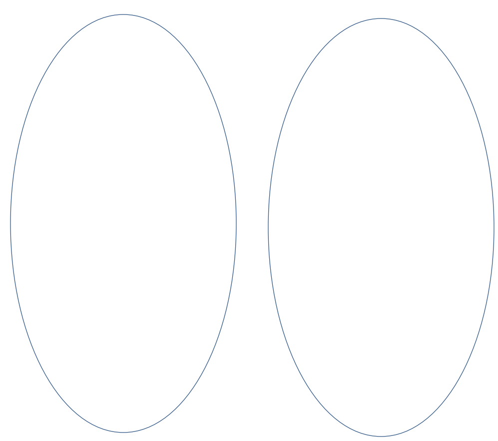
These two equations are obviously related (you took the first and rewrote it to get the second). The ordered pairs of each are found by ***switching the values of x and y***. They are called **inverse relations**.

Definition: The **inverse of a relation**

Ex. 1: Let $f = \{(1,4), (2,8), (3,8), (0,0), (-1,-4)\}$. Find the inverse of *f*.

The points (*x*, *y*) and (*y*, *x*) are reflection images of each other over the identity function $y = x$. That is, the reflection over the identity function switches the coordinates of the ordered pairs. So the graphs of any relation and its inverse are reflection images of each other over the line $y = x$.





The ***domain*** of *f* = ___________________________ =

The ***range*** of *f*= ____________________________ =

Inverse Relation Theorem:

Suppose *f* is a relation and g is the inverse of *f*. Then the following are true:

1. A rule for g can be found by ____
2. The graph of g is the _____________________ of the graph of *f* over the line $y = x$
3. The ________ of g is the _________ of *f*, and the ________ of g is the ______ of *f*.

The inverse of a relation is always a relation. But the inverse of a function is ***not always a function***.
Using example 1, is *f* a function? Explain.

Is its inverse a function? Explain.

Ex 2: Consider the function $y = x^2$. What is the domain of this function?

What is the rule for its inverse?

Graph both equations below (use a t-chart to help you, if needed)

From these examples, notice that you can tell by looking at the graph of the *original* function whether or not its inverse is a function.

The Horizontal Line Test: The inverse of a function is itself a function if and only if _______________
____.