Unit 2 (2.4) Inverses Notes

Finding Inverses:

The domain of a relation becomes the range of the inverse, and the range of a relation becomes the domain of the inverse.

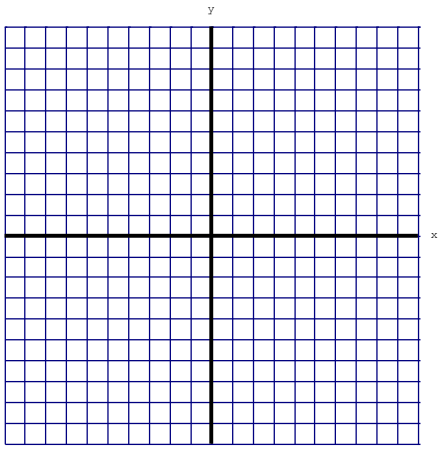
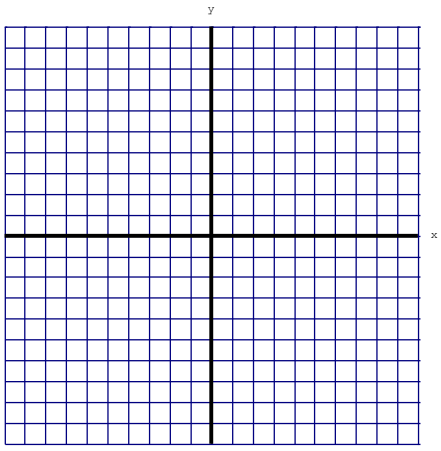
To put it more simply: _____

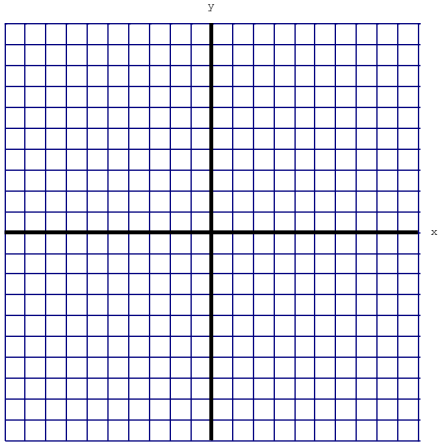
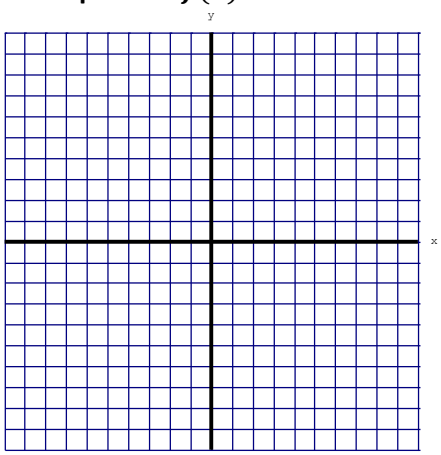
The graph of the original relation will be reflected over _____

Steps:

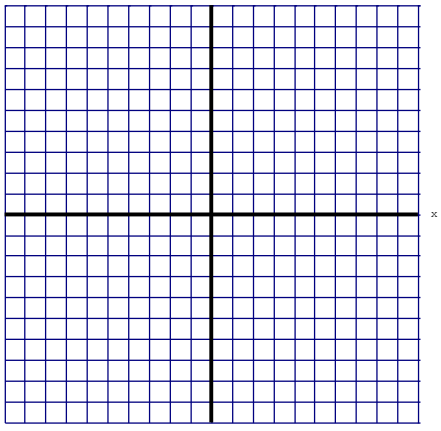
1. Replace $f(x)$ with y.
2. Switch x and y.
3. Solve for y.
4. Replace y with $f^{-1}(x)$.

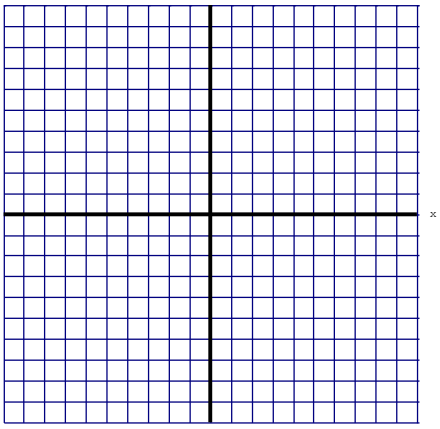
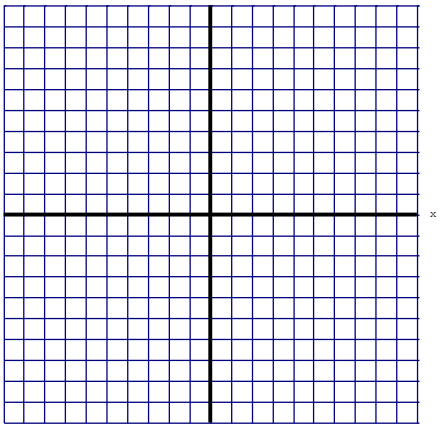
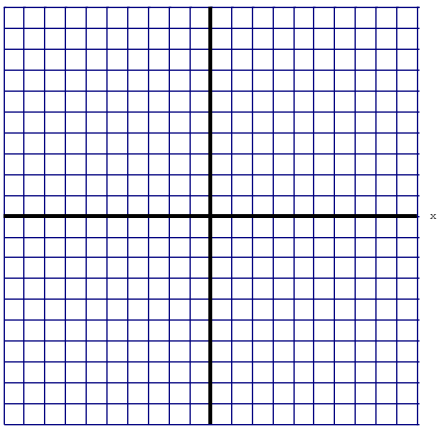
Examples:

Find the Inverse	**Graph both $f(x)$ and its inverse**
1. $(2,1), (5,1), (2,-4)$ (coordinates of the vertices of a right triangle)	
Find the Inverse	**Graph both $f(x)$ and its inverse**
2. $f(x) = 2x - 6$	

Find the Inverse	Graph both $f(x)$ and its inverse
3. $f(x) = \frac{2x+12}{6}$	
Find the Inverse	**Graph both $f(x)$ and its inverse**
4. $f(x) = -\frac{3}{2}x + 9$	

Finding the inverse of a non-linear equation:

	Graph both $b(x)$ and its inverse
1. Find $b^{-1}(x) : b(x) = \sqrt{2x-4}$	

2. Find $e^{-1}(x)$: $e(x) = \sqrt{x-3} + 1$	**Graph both $e(x)$ and its inverse** 
3. Find $c^{-1}(x)$: $c(x) = (x+4)^2 - 2$	**Graph both $c(x)$ and its inverse** 
4. Find $f^{-1}(x) : f(x) = (x-3)^2 + 5$	**Graph both $f(x)$ and its inverse** 

If you don't have a graph, how do you know you solved for the inverse correctly?

Proving $f(x)$ and $f^{-1}(x)$ are inverses.

Check to see if the compositions of $f(x)$ and $f^{-1}(x)$ is the identity function. ($y = x$)

$$f\left(f^{-1}(x)\right) = x \qquad \& \qquad f^{-1}\left(f(x)\right) = x$$

PROVE that the following are inverses by using compositions.

1. $f(x) = \frac{3}{4}x - 6$ and $g(x) = \frac{4}{3}x + 8$

2. $f(x) = 2x^2 - 1$ and $g(x) = \sqrt{\frac{x+1}{2}}$

3. $f(x) = \frac{1}{3}x + 10$ and $g(x) = 3x - 30$

4. $f(x) = \frac{x^2+3}{2}$ and $g(x) = \sqrt{2x - 3}$