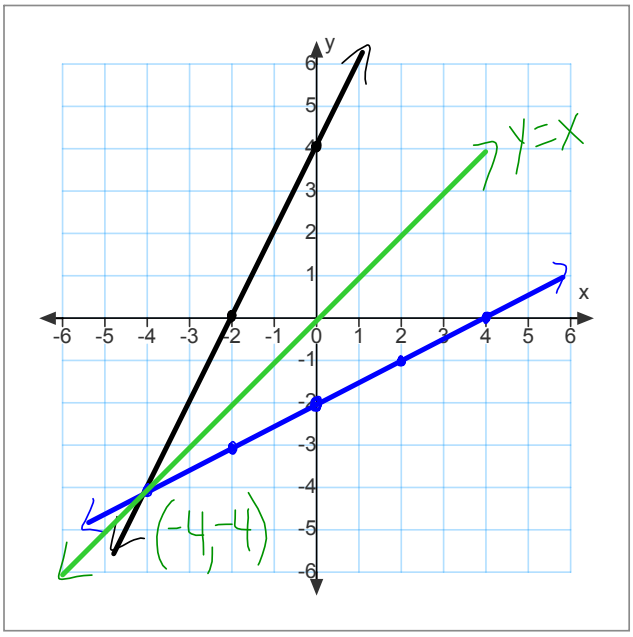
# 1.4 Inverse of a Relation

In math, inverse operations "undo" each other.

$+ \& -$, $\times \& \div$, $\sqrt{x} \& x^2$

Inverse functions involve inverse operations, in the opposite order. The result is $x \leftrightarrow y$.

Graph $f(x) = 2x + 4$. Look at the table of values.




$y = 2x + 4$ switch $x \leftrightarrow y$

$x = 2y + 4$ isolate $y$

$x - 4 = 2y$

$\frac{x-4}{2} = y$

$y = \frac{1}{2}x - 2$

$f^{-1}(x) = \frac{1}{2}x - 2$

$y = x$ is the reflection line for all inverses.

$f^{-1}(x) \neq \frac{1}{f(x)}$

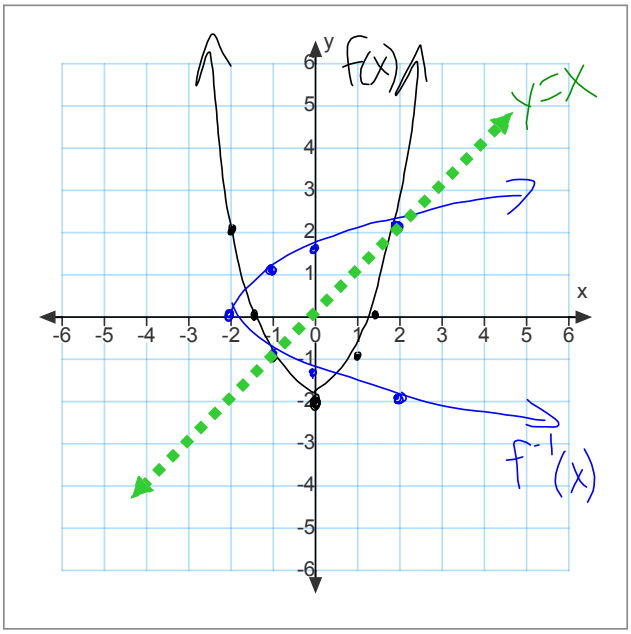
$\downarrow$

means "inverse" of $f(x)$

Read thru ex1) on pg. 46-47.

Horizontal line test tells us whether the inverse will be a function or not.

ex) Graph $f(x)=x^2-2$. Then graph its inverse.




$$y=x^2-2$$
$$x=y^2-2$$
$$x+2=y^2$$
$$\pm\sqrt{x+2}=y$$
$$\pm\sqrt{x+2}=f^{-1}(x)$$

Restrict the domain of the original function so the inverse is a function

f(x) D: $\{x\geq 0\}$ or $\{x\leq 0\}$

pg. 49 Ex 3)

a) $f(x) = 3x + 6$

$y = 3x + 6$

$x = 3y + 6$

$\frac{x-6}{3} = y$

$\frac{1}{3}x - 2 = y$

$\frac{1}{3}x - 2 = f^{-1}(x)$

b) $f(x) = x^2 - 4$

$y = x^2 - 4$

$x = y^2 - 4$

$\pm\sqrt{x+4} = y$

$\pm\sqrt{x+4} = f^{-1}(x)$

if $f(x)$ has D: $\{x \geq 0\}$ or $\{x \leq 0\}$

pg. 51-55 #1-6 warm-up

#8-15

#16, 20, 21, 62