$$\sqrt{45} \qquad \sqrt{27}$$

$$\sqrt[3]{16}$$

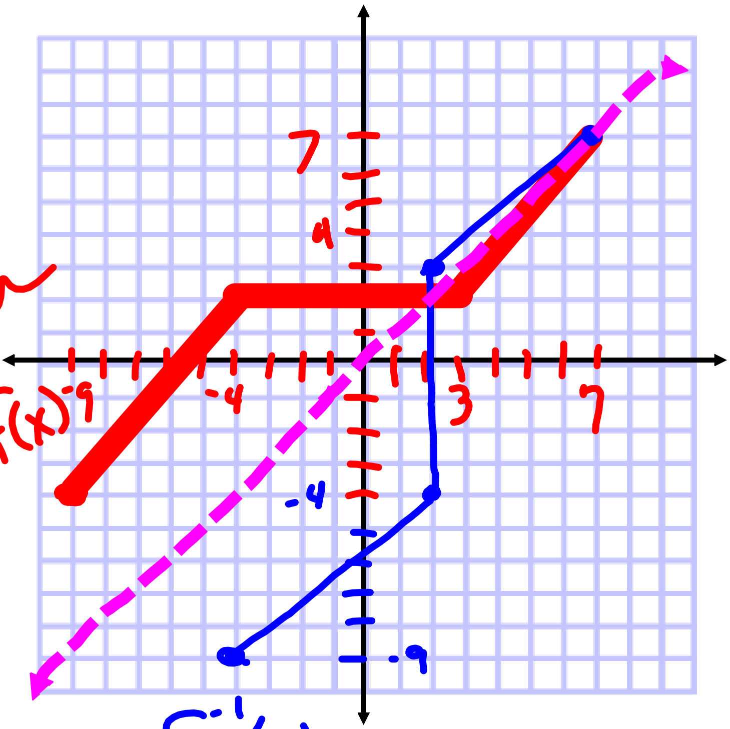
Inverse Functions

8/16

Function Notation

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

Graphically



f(x)

Inverse functions reflected over y=x

f(x)

x	y
-9	-4
-4	2
3	2
7	7

$f^{-1}(x)$

x	y
-4	-9
2	-4
2	3
7	7

Switch Domain & range

Table

x	y
-3	6
-2	9
0	10
1	18
5	19

$f^{-1}(x)$

x	y
6	-3
9	-2
10	0
18	1
19	5

Set notation

(3, 2), (-5, 4), (6, 5)

$f^{-1}(x)$ (2, 3), (4, -5), (5, 6)

Algebraically

$f(x)=2x+4$

$y=2x+4$

$x=2y\cancel{+4}$

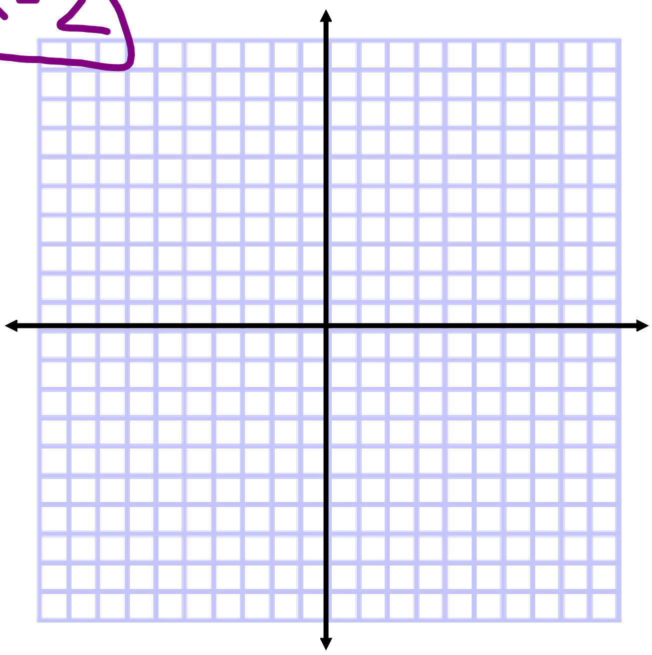
-4

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

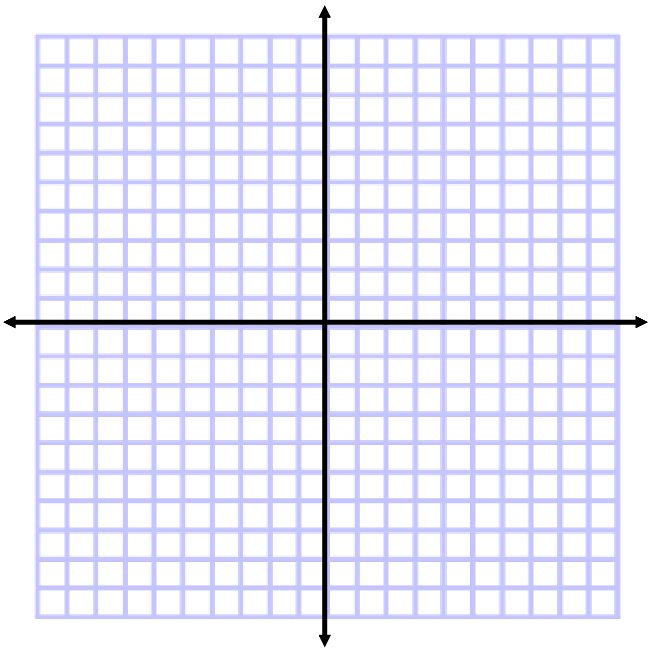
$\frac{1}{2}x-2=y$

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

1. Change f(x) to y
2. Switch x & y
3. Solve for y
4. Change y to $f^{-1}(x)$



$f(x)= x-6$



$$f(x) = x^2 + 2$$

$$y = x^2 + 2$$

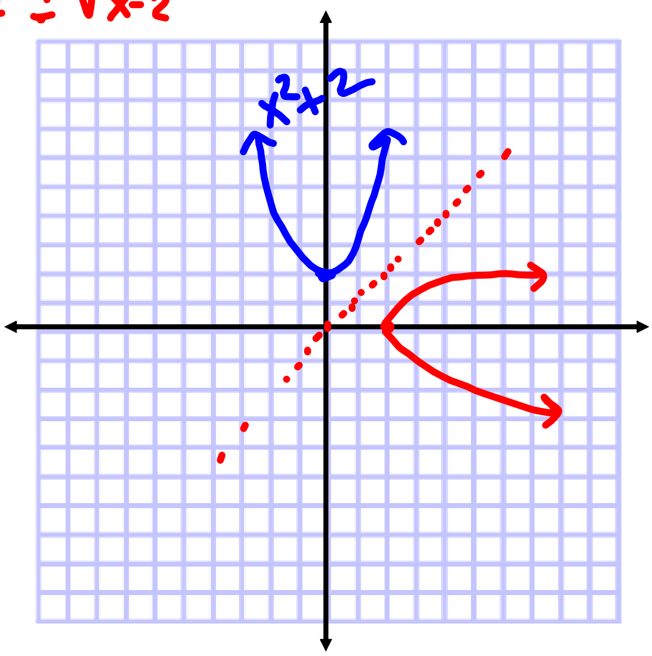
$$x = y^2 \cancel{+2}$$

$$-2$$

$$\sqrt{x-2} = \sqrt{y^2}$$

$$\pm\sqrt{x-2} = y$$

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

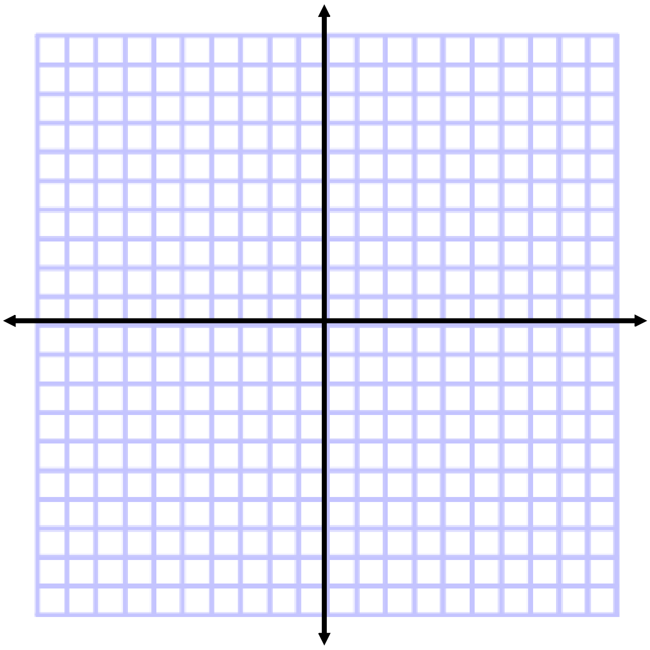


$y = x^2 + 5$

$x = y^2 + 5$

$\pm\sqrt{x-5} = y$

$\boxed{f^{-1}(x) = \pm\sqrt{x-5}}$



Are the functions inverses?

$$g(x) = -1 - \frac{1}{4}x$$

$$f(x) = -4x - 4$$

$g(f(x))$

$g(x) = -1 - \frac{1}{4}x$

$g(f(x)) = -1 - \frac{1}{4}(-4x-4)$

$= -1 + x + 1$

$g(f(x)) = x$

$f(g(x))$

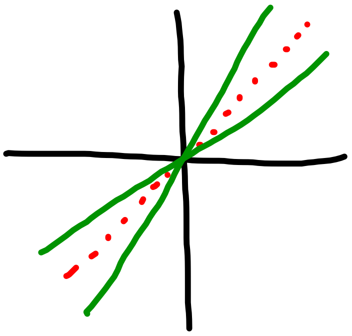
$f(x) = -4x - 4$

$f(g(x)) = -4(-1-\frac{1}{4}x) - 4$

$= 4 + x - 4$

$f(g(x)) = x$

If both $= x$, then the orig. eq. are inverses



$$h(x) = -\frac{1}{2}x + \frac{3}{2}$$

$$f(x) = x - 1$$

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

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

$$= \frac{1}{2}x + 2$$

Not inverses

$$g(x) = \frac{2x - 4}{3}$$

$$f(x) = \frac{4 + 3x}{2}$$