Inverses of Functions

Inverses from Tables & Order Pairs

Inverses from Graphs

Inverses from Equations

Vertical Line Test

Is this graph a function??

Horizontal Line Test

Is this graph's inverse a function??

Inverses of Functions

RULE: Switch x + y to get new points

RULE:
1. Write down some ordered pairs from graph.
2. Switch x + y
3. Plot new points + connect with curve (line)

RULE:
1. replace f(x) with y
2. switch x + y
3. solve for y

RULE:

Vertical line test - If you can run a vertical line across a graph + it only touches 1 pt. at a time, then that graph is a function.

Horizontal line test - If you can run a horizontal line across a graph + it only touches 1 pt at a time, then the inverse is a function.

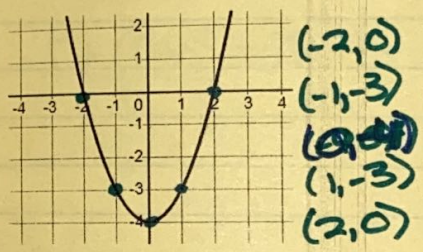
Original		Inverse	
x	y	x	y
0	8	8	0
1	12	12	1
2	16	16	2
3	20	20	3
4	24	24	4

Original:

(2,1), (3, -3), (5, 6), (-1, 7)

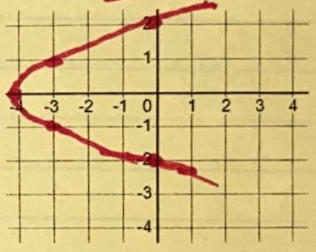
Inverse:

(1,2) (-3,3) (6,5) (7,-1)



(-2,0)
(-1,-3)
(0,-4)
(1,-3)
(2,0)

Inverse



(0,-2)
(-3,-1)
(-4,0)
(-3,1)
(0,2)

Ex. 1

$2x - 3y = 12$

$2y - 3x = 12$

$+3x \quad +3x$

$\frac{2y}{2} = \frac{3x}{2} + \frac{12}{2}$

$y = \frac{3}{2}x + 6$

Ex. 2

$f(x) = \sqrt[3]{x+3} - 4$

$y = \sqrt[3]{x+3} - 4$

$x = \sqrt[3]{y+3} - 4$

$+4 \quad +4$

$(x+4)^3 = (\sqrt[3]{y+3})^3$

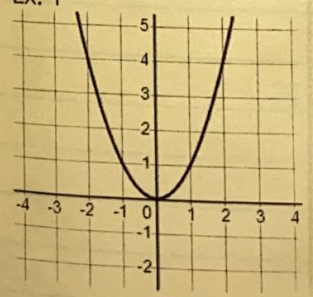
$(x+4)^3 = y+3$

$-3 \quad -3$

$y = (x+4)^3 - 3$

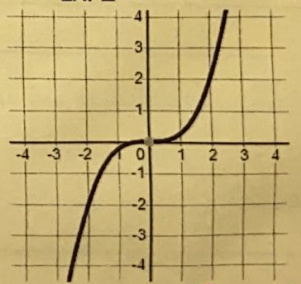
PEMDAS ↑ Solve

Ex. 1



graph: function
inverse: not a function

Ex. 2



graph: function
inverse: function

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Use Compositions to Verify Inverses

* Two functions are inverses of each other if $f(g(x)) = x$ and $g(f(x)) = x$.

Use compositions to determine whether the functions are inverses or not.

1. $f(x) = 3x - 7 \quad g(x) = \frac{x+7}{3}$

$f(g(x)) = 3\left(\frac{x+7}{3}\right) - 7$

$= x + 7 - 7$

$= x$ ✓

$g(f(x)) = \frac{(3x-7)+7}{3}$

$= \frac{3x-7+7}{3}$

$= \frac{3x}{3} = x$ ✓

Yes, they are inverses.

2. $f(x) = \frac{1}{2}x - 3 \quad g(x) = 2x - 3$

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

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

$= x - \frac{9}{2}$ ← doesn't $= x$

No, they aren't inverses.