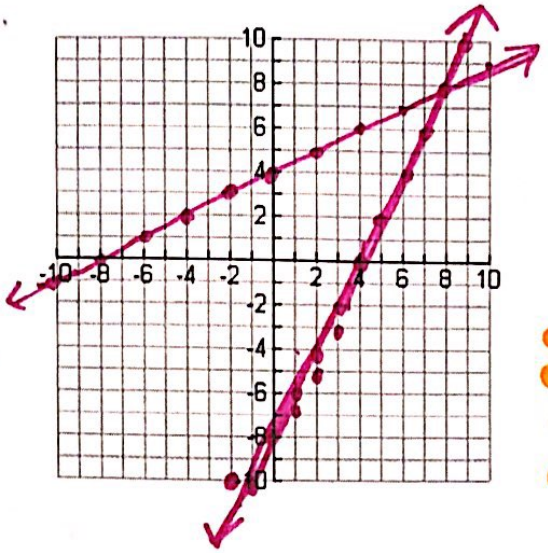
Unit 1 Day 5: Exploration: Inverses of Functions

Graph $g(x)=\frac{x}{2}+4$ and fill in the table. Graph $f(x)=2x-8$ and fill in the table:

(graph these on the same graph below:)

X	g(x) ("y")	
-4	2	
-3	5/2	2.5
-2	3	
-1	7/2	3.5
0	4	
1	9/2	4.5
2	5	
3	11/2	5.5
4	6	
5	13/2	6.5



x	f(x)
-4	-16
-3	-14
-2	-12
-1	-10
0	-8
1	-6
2	-4
3	-2
4	0
5	2

What do you notice about the ordered pairs in each function?

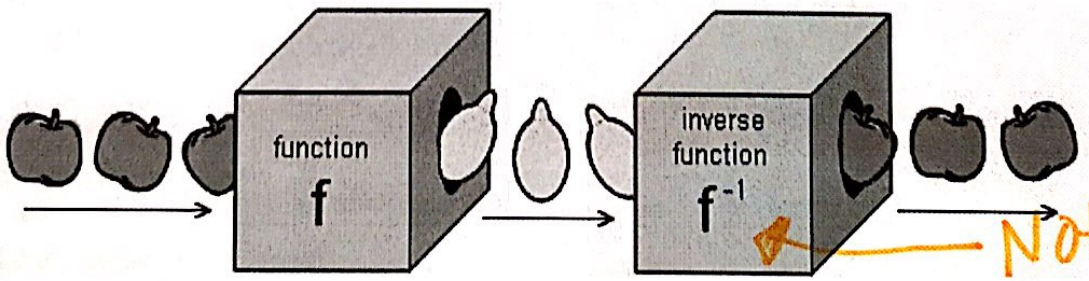
The x's & y's switch

something with slope ($\frac{1}{2}$ & $\frac{2}{1}$)

Is there a relationship between $f(x)$ and $g(x)$?

Yes! They are inverses!!

Inverse: a function that reverses another function.



Steps!!

Notation.

To find the inverse of a function, switch x & y **and then**

solve for y (equation)!

*Replace y with $f^{-1}(x)$.

Examples

Ex 1) Find the inverse on $y = 8 - 3x$

$x = 8 - 3y$

$-8 \quad -8$

$\frac{x-8}{-3} = \frac{-3y}{-3}$

$\frac{x-8}{-3} = y$

$f^{-1}(x) = \frac{x-8}{-3}$

Ex 2) Find the inverse of $y = \frac{x+5}{2}$

$x = \frac{y+5}{2}$

$(*2) \quad (*2)$

$2x = y + 5$

$-5 \quad -5$

$2x - 5 = y$

Ex 3) Find the inverse of $y = 3x^2 - 5$

$x = 3y^2 - 5$

$+5 \quad +5$

$\frac{x+5}{3} = \frac{3y^2}{3}$

$\sqrt{\frac{x+5}{3}} = \sqrt{y^2}$

$y = \sqrt{\frac{x+5}{3}}$

Ex 4) Find the inverse of $y = x^3$

$\sqrt[3]{x} = \sqrt[3]{y^3}$

"Cube root"

$\sqrt[3]{x} = y$

You try! Find the inverse of $y = 3x + 4$

$x = 3y + 4$

$y = \frac{x-4}{3}$

You try! Find the inverse of $y = 4 + \frac{1}{2}x$

$\frac{x-4}{1/2} = y$

$y = 2x - 8$

You try! Find the inverse of $y = x^2 - 5$

$y = \sqrt{x+5}$

You try! Find the inverse of $y = \sqrt{x+3}^2$

$x^2 - 3 = y$

$y = x^2 - 3$

Functions Operations

Add: $(f+g)(x) = f(x) + g(x)$

Subtract: $(f-g)(x) = f(x) - g(x)$

Multiply: $(f \cdot g)(x) = f(x) \times g(x)$

$f(x) = 3x+4 \qquad g(x) = x^2 - 2x$

① $(f+g)(x) = (3x+4) + (x^2 - 2x)$

$= x^2 + x + 4$

② $(f-g)(x) = (3x+4) - (x^2 - 2x)$

$= 3x + 4 - x^2 + 2x$

$= -x^2 + 5x + 4$

③ $(f \cdot g)(x) = (3x+4) \cdot (x^2 - 2x)$

$= 3x^3 - 2x^2 - 8x$

$3x^3 - 6x^2 + 4x^2 - 8x$

$3x^2 - 2x^2 - 8x$

	x^2	$-2x^1$
$3x^1$	$3x^3$	$-6x^2$
4	$4x^2$	$-8x$