

6.2 Inverse Functions & Relations- Day 1 Notes

Objective: Find and graph the inverse of a function or relation

An inverse relation is the set of ordered pairs obtained by switching the x & y values. If the inverse of $f(x)$ is a function, we use inverse function notation: $f^{-1}(x)$.

Graph the relation and connect the points. Then graph the inverse. Identify the domain & range of each relation.

Relation:

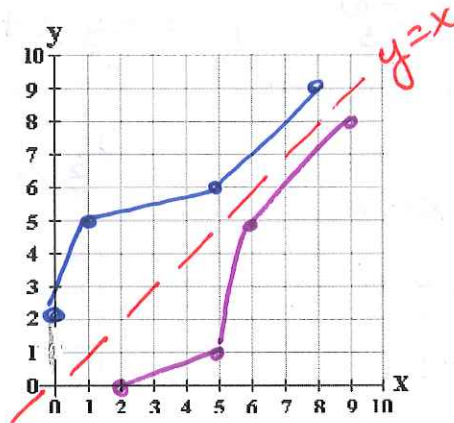
x	0	1	5	8
y	2	5	6	9

Domain: $[0, \infty)$
 Range: $[2, 9]$

Inverse:

x	2	5	6	9
y	0	1	5	8

Domain: $[2, 9]$
 Range: $[0, 8]$



Property of Inverses: Two functions are inverses if they 'undo' one another. Inverse functions have their points reflected across the line $y=x$.

To find inverses of functions:

- step 1: rewrite using x & y
- step 2: switch the x & y
- step 3: solve for y

Write the inverse of the function. Graph both the function & its inverse (label each.)

Ex: $f(x) = 2x - 8$

$f^{-1}(x) = \frac{1}{2}x + 4$

x	y
0	-8
4	0
6	4

x	y
-8	0
0	4
4	6

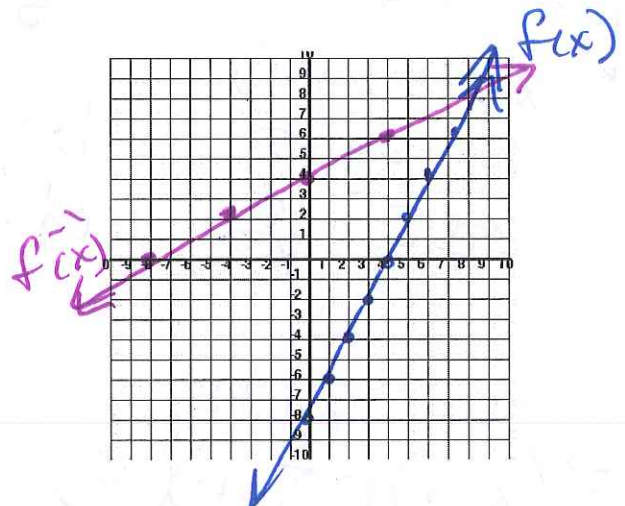
$$x = 2y - 8$$

$$+8 \quad \quad +8$$

$$\frac{x+8}{2} = \frac{2y}{2}$$

$$y = \frac{x}{2} + \frac{8}{2}$$

$$= \frac{1}{2}x + 4$$



1. $f(x) = -3x + 6$

x	y
0	6
2	0
4	-6

$$x = -3y + 6$$

$$x - 6 = -3y$$

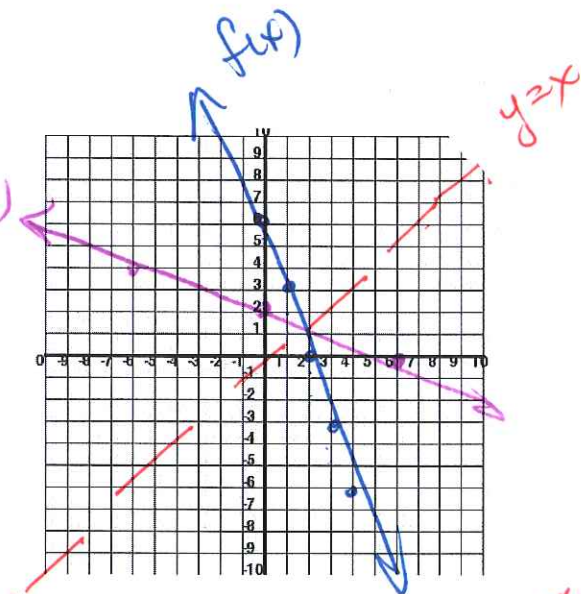
$$\frac{x - 6}{-3} = \frac{-3y}{-3}$$

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

x	y
6	0
0	2
-6	4

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

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



Write and graph the inverse of each function.

Ex. $f(x) = 3(x - 4)$

$= 3x - 12$

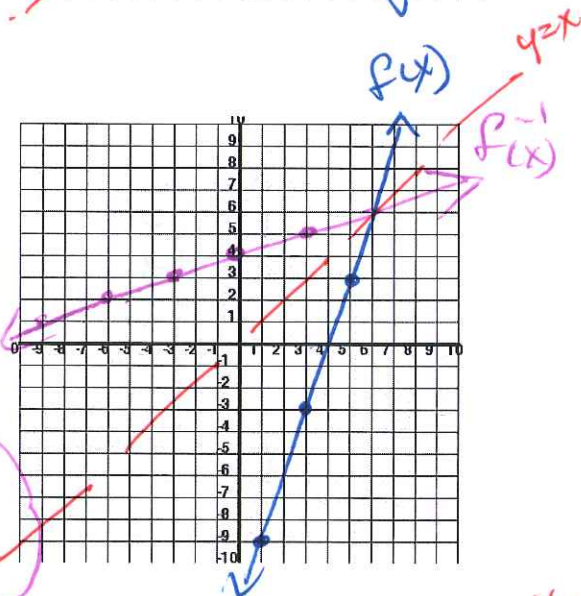
x	y
1	-9
3	-3
5	3

Solution
Option
#1

$$x = 3(y - 4) \Rightarrow \frac{x}{3} = y - 4 \Rightarrow \frac{x}{3} + 4 = y$$

$f^{-1}(x) = \frac{1}{3}x + 4$

x	y



2. $f(x) = -5(x + 1)$

x	y
0	-5
-1	0
-2	5

Solution
Option
#2

$$x = -5(y + 1)$$

$$x = -5y - 5$$

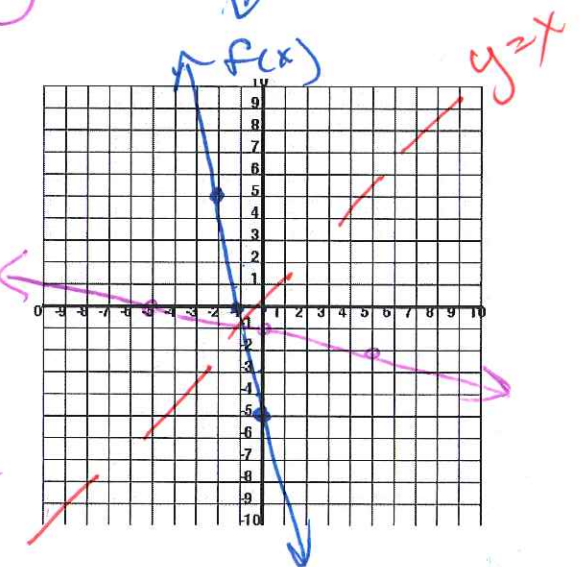
$$\frac{x + 5}{-5} = \frac{-5y}{-5}$$

$f^{-1}(x) = -\frac{1}{5}x - 1$

x	y
-5	0
0	-1
5	-2

$$y = \frac{x}{-5} - 1$$

$$\text{or } y = -\frac{1}{5}x - 1$$



Write the inverse of each function.

Ex. $f(x) = -\frac{5}{3}x + 5$

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

$$\frac{-3}{5}(x - 5) = \frac{-5}{3}y \left(\frac{-3}{5}\right)$$

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

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

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

$$\frac{-3}{1}(x - 3) = \frac{-1}{3}y \left(\frac{-3}{1}\right)$$

$$-3x + 9 = y$$