Lesson 5.6 Inverse Functions NOTES **Alg 2** **Date** _____

OBJECTIVE 1: Finding an Inverse of a Function

1. Switch the x and y or f(x).
2. Solve for y.
3. Use proper notation = $f^{-1}(x)$ is the inverse function.

TASK 1: Determine the inverse of the function. Then find the output (y or f(x)) value when the input (x) is 2.

a) $y = x - 2$ $\Rightarrow x = y - 2$ $\Rightarrow x + 2 = y$ $x + 2 = 2$ $\Rightarrow 4$

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

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

c) $f(x) = 3x - 5$ $\Rightarrow x = 3y - 5$ $\Rightarrow \frac{x+5}{3} = \frac{3y}{3}$

$f^{-1}(x) = \frac{x+5}{3}$ $f^{-1}(2) = \frac{2+5}{3} = \frac{7}{3}$

STEPS:

1. Fill the original t-chart by picking x-values strategically.
2. Flip the coordinates by switching the x and y values
3. Graph your original coordinates and label
4. Graph your inverse coordinates and label
5. Check that you kept your domain restriction for original and range restriction for the inverse function.

TASK 2: Given a table. Graph the inverse function.

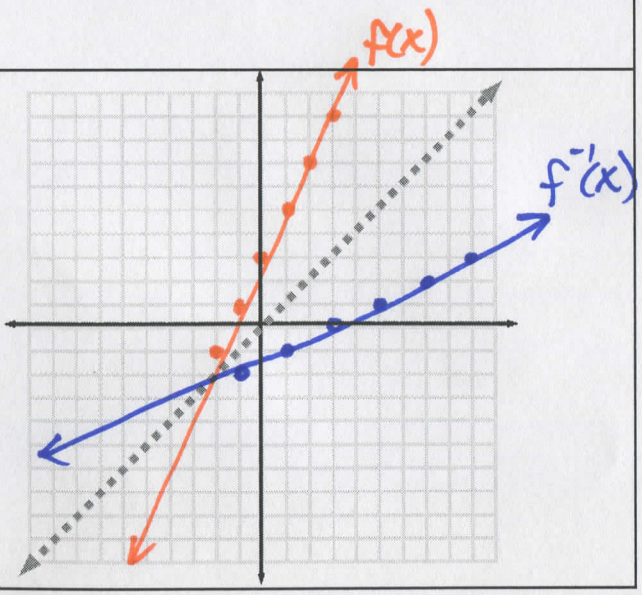
X	Y
-2	-1
-1	1
0	3
1	5
2	7

f(x)

X	Y
-1	-2
1	-1
3	0
5	1
7	2

$f^{-1}(x)$

Switch the x & y coordinates! then graph!



TASK 3: Find the inverse function and then graph the two functions. Label your graphs.

$f(x) = x^2 - 2;\ x \geq 0$

$[0, \infty)$

X	Y
0	-2
1	-1
2	2

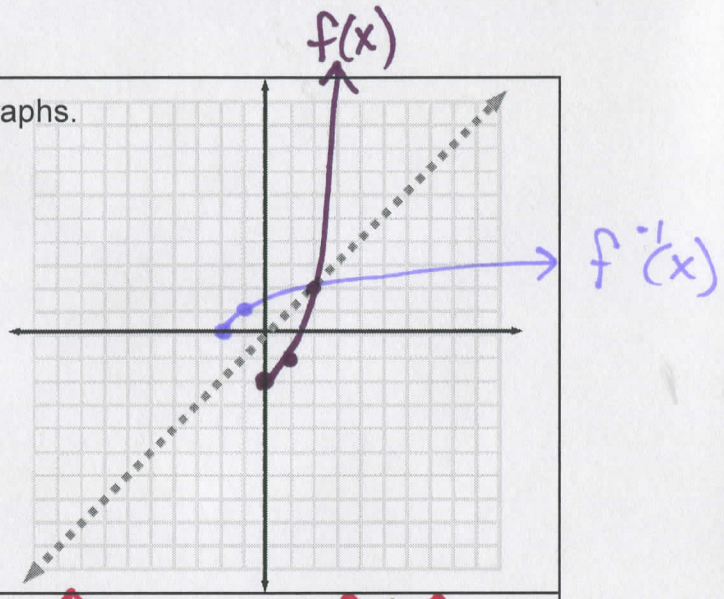
$f(x)$

$D: [0, \infty)$

X	Y
-2	0
-1	1
2	2

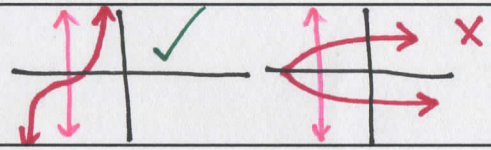
$f^{-1}(x)$

$R: [0, \infty)$



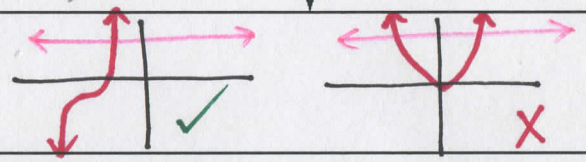
Vertical Line Test

ORIGINAL



Horizontal Line Test

Inverse



OBJECTIVE 2: Verifying Functions are Inverses

Use composition of functions to verify. Plug each function into the other function and if they both reduce to be x, then they are inverses of each other.

TASK 5: Show that these functions are inverses.

a) $f(x) = 3x - 1$ & $g(x) = \frac{x+1}{3}$

$f(g(x)) = 3\left(\frac{x+1}{3}\right) - 1 = x + 1 - 1 = x$ ✓

yes

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

$\frac{3x}{3} = x$ ✓

b) $f(x) = 8x^3$ & $g(x) = \sqrt[3]{2x}$

$f(g(x)) = 8\left(\sqrt[3]{2x}\right)^3 = 8(2x) = 16x$ X

NO

OBJECTIVE 3: Solving Real- Life Problems

Because these variables have real-life meaning, we solve for the unknown variables without switching the variables. So simply solve for the other variable.

TASK 6: Solve the real-world problem using inverses.

a) Find the inverse of the function that represents the volume of a sphere: $V = \frac{4}{3}\pi r^3$. Then find the volume of a sphere that has a radius of 288π cubic inches.

$\frac{3V}{4\pi} = r^3$

$V = 288\pi\ in^3$

$\sqrt[3]{\frac{3V}{4\pi}} = r$

$r = \sqrt[3]{\frac{288\pi(3)}{4\pi}} = \sqrt[3]{216} = 6\ in$

Still need help with: