6.8 - Inverses

* What does "inverse" mean? Opposite!

Steps: Finding an inverse algebraically:

1. Change $f(x) =$ to $y =$
2. Switch x & y in the equation
3. Solve for new y
4. Final answer $f^{-1}(x) =$

$x \to \frac{1}{x}$

$x \to x^{-1}$

ex.1 $f(x) = 3x - 7$

$y = 3x - 7$

$x = 3y - 7$

$\frac{x+7}{3}$ $\quad \frac{x+7}{3} = \frac{3y}{3}$

$y^{-1} = \frac{1}{3}x + \frac{7}{3}$

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

ex.2 $f(x) = 2\sqrt{x-2} + 5$

$y = 2\sqrt{x-2} + 5$

$x = 2\sqrt{y-2} + 5$

$\frac{x-5}{2} = \frac{2\sqrt{y-2}}{2}$

$\left(\frac{x-5}{2}\right)^2 = \left(\sqrt{y-2}\right)^2$

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

ex.3 $y = 2^{x-1} - 4$

$x = 2^{y-1} - 4$

$\log_2(x+4) = y - 1$

$\log_2(x+4) + 1 = y^{-1}$

Prove if they are inverses

Using Composition of functions!

$f(x) =$ $\quad g(x) =$

$f(g(x)) = x$

$g(f(x)) = x$

yes!

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ex.4 $f(x) = \log_3(x) + 1 \quad g(x) = 3^{x-1}$

$f(g(x)) = \log_3(3^{x-1}) + 1$

$= x - 1 + 1$

$= x$ ✓

$g(f(x)) = 3^{(\log_3 x + 1) - 1}$

$= 3^{\log_3 x}$

$= x$ ✓

yes!!

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ex.5 $f(x) = x^3 - 2 \quad g(x) = \sqrt[3]{x} + 2$

$f(g(x)) = (\sqrt[3]{x} + 2)^3 - 2$

$(\sqrt[3]{x}+2)(\sqrt[3]{x}+2)(\sqrt[3]{x}+2) - 2$

No!!

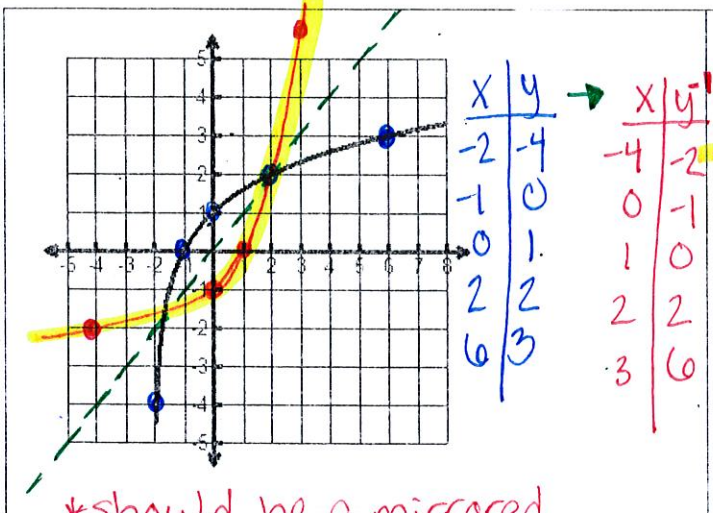
6.8 - Notes on Graphing Inverses

Name:_____

Inverses graphically – How do we find the Inverse of a function graphically?

Reflects over $y=x$

1. Step 1 – plot 4 to 5 points on the given graph
2. Step 2 – write down each ordered pair that corresponds with each plotted point
3. Step 3 – Switch the x values and y values in the ordered pairs
4. Step 4 – plot the NEW points on the same graph
5. Step 5 – play connect the dots to see the graph of the inverse

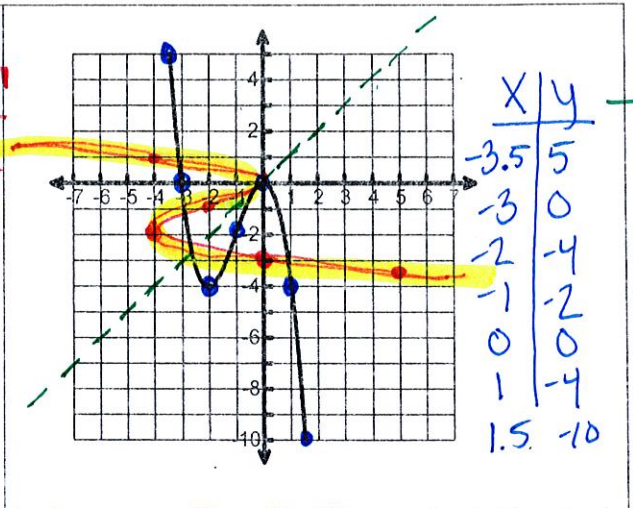


x	y
-2	-4
-1	0
0	1
2	2
6	3

→

x	y^{-1}
-4	-2
0	-1
1	0
2	2
3	6

*should be a mirrored



x	y
-3.5	5
-3	0
-2	-4
-1	-2
0	0
1	-4
1.5	-10

→

x	y^{-1}
5	-3.5
0	-3
-4	-2
-2	-1
0	0
-4	1
-10	1.5