Math 3 Name: Key

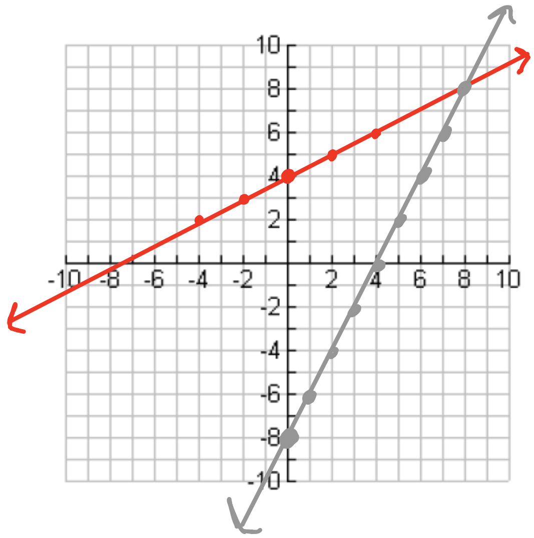
Unit 1 Day 7 Notes – Finding Inverses Date:____________

$g(x) = \frac{1}{2}x + 4$

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:)

	g(x)
-4	2
-3	
-2	3
-1	
0	4
1	
2	
3	
4	
5	

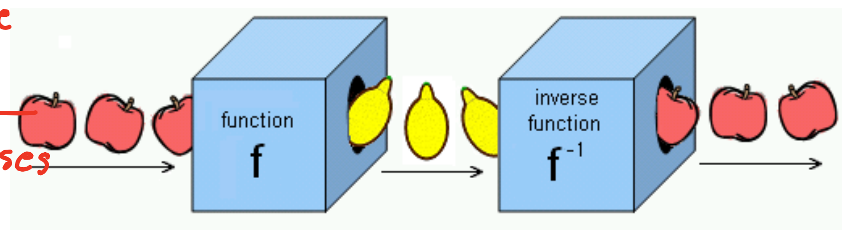


x	f(x)
-4	
-3	
-2	
-1	
0	
1	
2	-4
3	-2
4	0
5	

What do you notice about the ordered pairs in each function? Is there a relationship between f(x) and g(x)?

x + y values are flipping

f(x) + g(x) are inverses



How do I find inverses?

1. Find the __Domain__ **and the** __Range__ **of the given equation.**

2. Switch __x__ **and** __y__ **in the equation.**

3. Solve for __y__**.**

4. Make the range become the new __Domain__ **of the new equation, and make the domain become the new** __Range__ **of the new equation.**

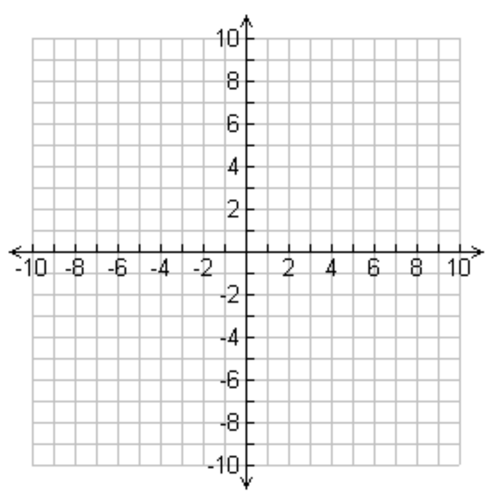
Example 1: $y = \frac{1}{2}x - 7$ $f(x) = \frac{1}{2}x - 7$

$x = \frac{1}{2}y \cancel{-7}$

$+7 \quad \cancel{+7}$

$2(x + 7) = (\frac{1}{\cancel{2}}y)\cancel{2}$

$2x + 14 = y$, $\boxed{f^{-1}(x) = 2x + 14}$



Example 2: $y = 3(x+2)^2 - 4$ $f(x) = 3(x+2)^2 - 4$

$x = 3(y+2)^2 \cancel{+4}$

$+4 \qquad \cancel{+4}$

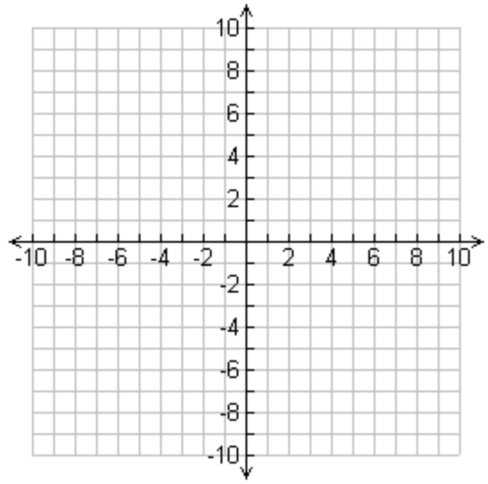
$\frac{x+4}{3} = \frac{\cancel{3}(y+2)^2}{\cancel{3}}$

$\sqrt{\frac{x+4}{3}} = \sqrt{(y+2)^{\cancel{2}}}$ $f^{-1}(x) = \sqrt{\frac{x+4}{3}} - 2$

$\sqrt{\frac{x+4}{3}} = y \cancel{+2}$

$-2 \qquad \cancel{-2}$

$\sqrt{\frac{x+4}{3}} - 2 = y$



Example 3: $y = 2(x+7)^3 - 2$ $f(x) = 2(x+7)^3 - 2$

$x = 2(y+7)^3 \cancel{-2}$

$+2 \qquad \cancel{+2}$

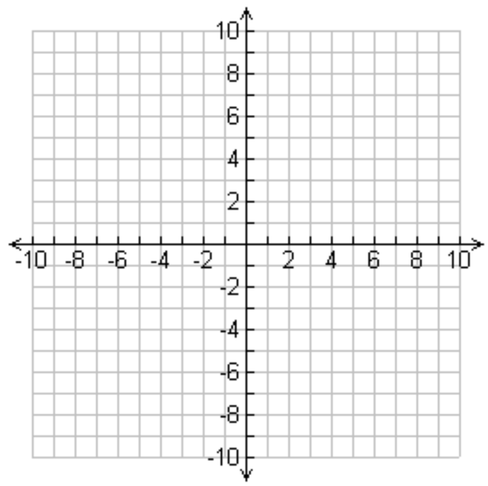
$\frac{x+2}{2} = \frac{\cancel{2}(y+7)^3}{\cancel{2}}$

$\sqrt[3]{\frac{x+2}{2}} = \sqrt[3]{(y+7)^{\cancel{3}}}$ $f^{-1}(x) = \sqrt[3]{\frac{x+2}{2}} - 7$

$\sqrt[3]{\frac{x+2}{2}} = y \cancel{+7}$

$-7 \qquad \cancel{-7}$

$\sqrt[3]{\frac{x+2}{2}} - 7 = y$



Example 4: $y = 3\sqrt{x-3} + 6$ $f(x) = 3\sqrt{x-3} + 6$

1st

$x = 3\sqrt{y-3} \cancel{+6}$

$-6 \qquad \cancel{-6}$

2nd

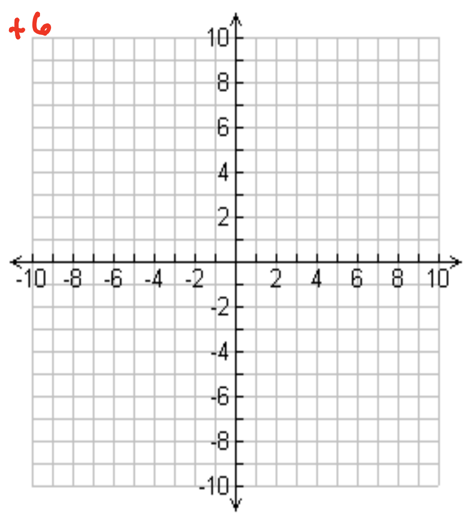
$\frac{x-6}{3} = \frac{\cancel{3}\sqrt{y-3}}{\cancel{3}}$

$\left(\frac{x-6}{3}\right)^2 = \left(\cancel{\sqrt{}}y-3\right)^{\cancel{2}}$ $f^{-1}(x) = \left(\frac{x-6}{3}\right)^2 + 3$

$\left(\frac{x-6}{3}\right)^2 = y-3$

$+3 \qquad +3$

$\left(\frac{x-6}{3}\right)^2 + 3 = y$



Example 5: $y = 2\sqrt[3]{x+3} - 6$ $\quad f(x) = 2\sqrt[3]{x+3} - 6$

$x = 2\sqrt[3]{y+3} \cancel{-6}$
$+6 \qquad\qquad \cancel{+6}$

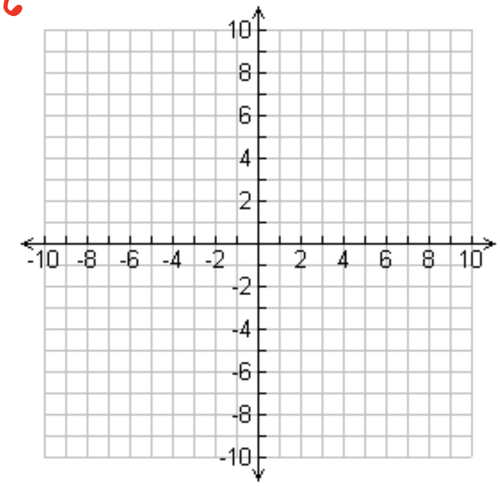
$\dfrac{x+6}{2} = \dfrac{\cancel{2}\sqrt[3]{y+3}}{\cancel{2}}$

$\left(\dfrac{x+6}{2}\right)^3 = \left(\cancel{\sqrt[3]{y+3}}\right)^{\cancel{3}}$

$\left(\dfrac{x+6}{2}\right)^3 = y \cancel{+3}$
$-3 \qquad \cancel{-3}$

$\left(\dfrac{x+6}{2}\right)^3 - 3 = y$

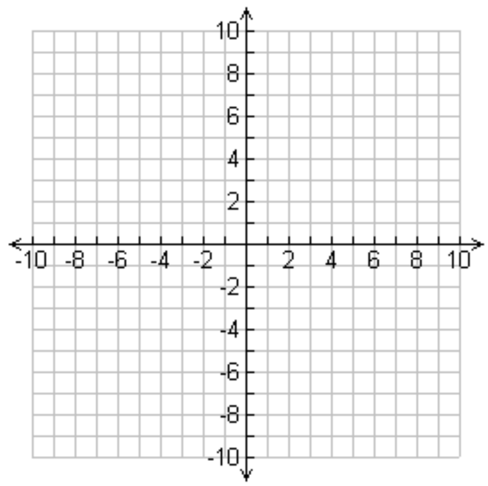
$f^{-1}(x) = \left(\dfrac{x+6}{2}\right)^3 - 3$



You Try! $y = 4(x+8)^2 - 5$

$f(x) = 4(x+8)^2 - 5$

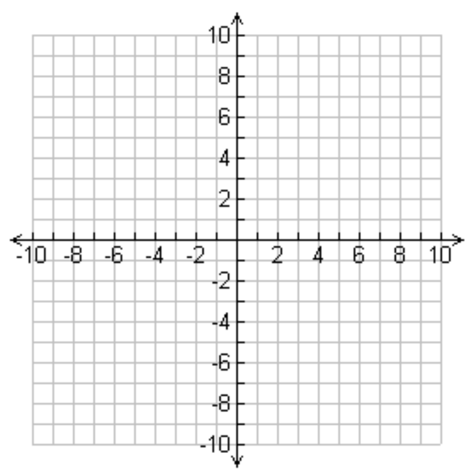
$f^{-1}(x) = \sqrt{\dfrac{x+5}{4}} - 8$



You Try! $y = 4\sqrt{x+7} + 5$

$f(x) = 4\sqrt{x+7} + 5$

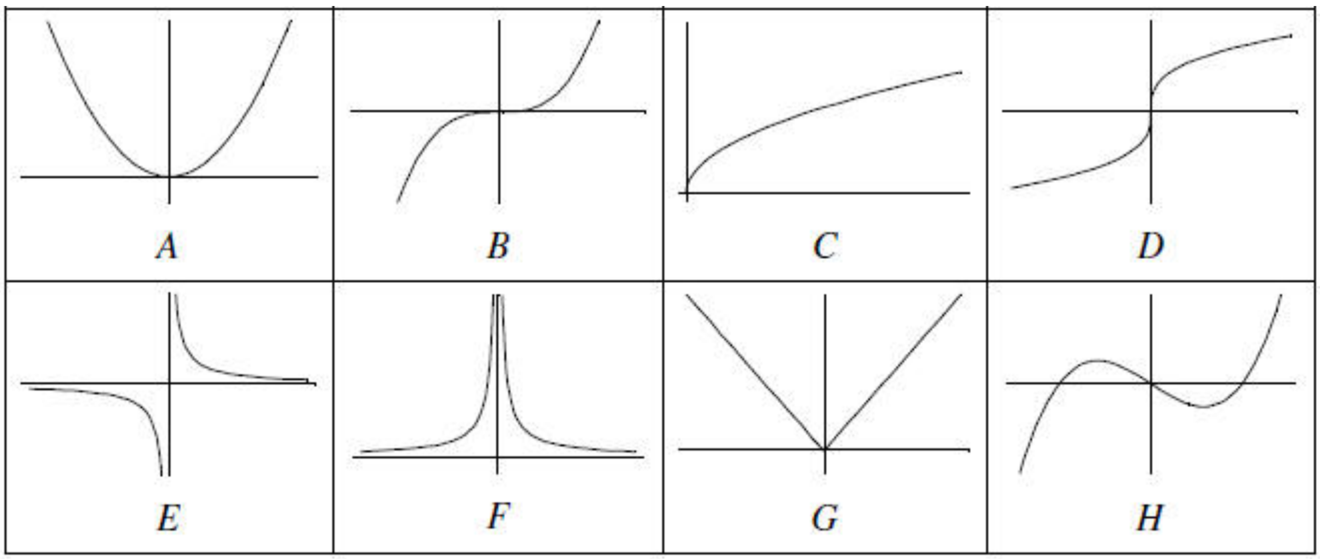
$f^{-1}(x) = \left(\dfrac{x-5}{4}\right)^2 - 7$



Use the horizontal line test to determine if a function has an inverse function.

If ANY horizontal line intersects your <u>original function</u> in ONLY ONE location, your function has an inverse which is also a function.

Which of the following functions would have inverses that are a function?



Go back and look at the inverses you found in the notes...are these functions??