Notes 7 **Name ________________________**

Inverse Functions (1.8)

(INVESTIGATION)

The idea of inverse in mathematics:

- Take the inverse operation to solve: $x + 2 = 5$
- Invert the fraction $\frac{3}{4}$: ______

What is the inverse of a function?

- What is a function?
- What is the inverse?

Understanding the Content:

Given $f(x) = \frac{1}{2}x + 2$

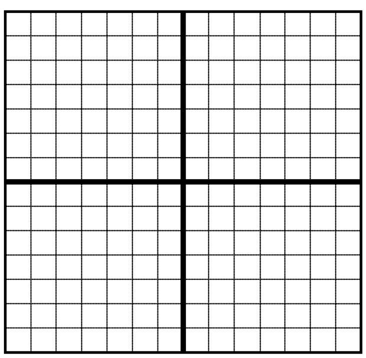
1) Complete the table

x	**f(x)**
4	
2	
0	
-2	
-4	

2) Take the values of f(x) in the previous table and copy them under x in the table below.

x	**g(x)**
	4
	2
	0
	-2
	-4

3) Plot the points for f(x) and connect the points. Plot the points for g(x) and connect the points.



4) Write an equation for g(x) using point-slope form $(y - y_1) = m(x - x_1)$.

5) Fold the paper so that graphs of f and g match up (on top of each other). How are the graphs geometrically related?

6) Find $(f \circ g)$ and $(g \circ f)$. What do you notice?

Conclusions:

- The inverse of a function is when all of the x and f(x) values switch.
- The domain of f(x) becomes the range of $f^{-1}(x)$ and the range of f(x) becomes the domain of $f^{-1}(x)$.
- A function and its inverse reflect over y = x. Reflections also means that the two functions are equidistant (that is the perpendicular distance) is always the same).

Find the inverse:

Given a table:

7)

x	2	-1	3
y	3	0	4

x			
y			

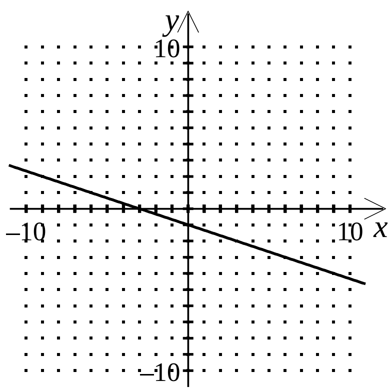
Given a function:

8) f(x) = 2x – 1

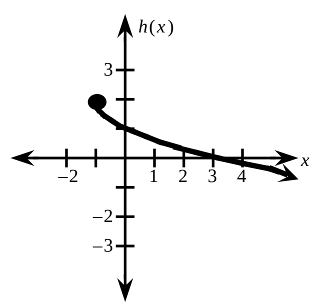
9) $f(x) = 16x^2, x \le 0$

Given a graph:

10)



11)



Verifying inverses:

12) $f(x) = \frac{1}{2}x + 3$ and g(x) = 2x – 6

(EXTENSION)

Verifying Inverse Functions: Find $f(g(x))$ and $g(f(x))$ and determine whether each pair of functions f and g are inverses of each other.

13) $f(x) = 4x + 9$ and $g(x) = \dfrac{x-9}{4}$

14) $f(x) = \sqrt[3]{x-4}$ and $g(x) = x^3 + 4$

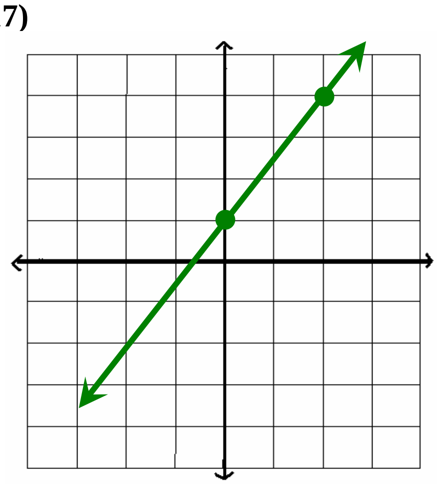
Finding an Inverse Algebraically: Find an equation for $f^{-1}(x)$, the inverse function.

15) $f(x) = x^3 - 1$

16) $f(x) = \dfrac{2x-3}{7x+2}$

Graphing Inverse Functions Using a Graph: Use the graph of *f* to draw the graph of its inverse function**.**

17)



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