

Name:

Period:

Date:

**Math Lab: Investigating Inverses**

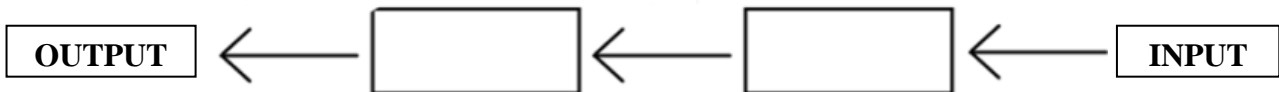
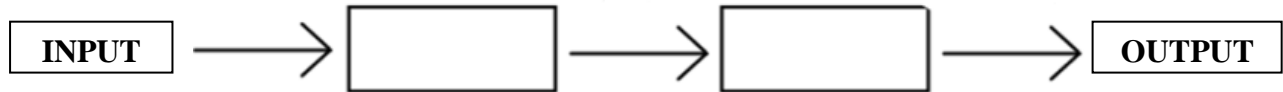
Discuss with your partner and answer the following question:

$a + (-a) = 0$  is the inverse property of addition.

$a \left(\frac{1}{a}\right) = 1$  is the inverse property of multiplication.

Why are they called the inverse properties?

The **inverse of a function** is the “undoing” of the function. Consider,  $f(x) = 2x + 3$ .



So, the inverse of  $f(x) = 2x + 3$  is  $f^{-1}(x) = \frac{x-3}{2}$ .

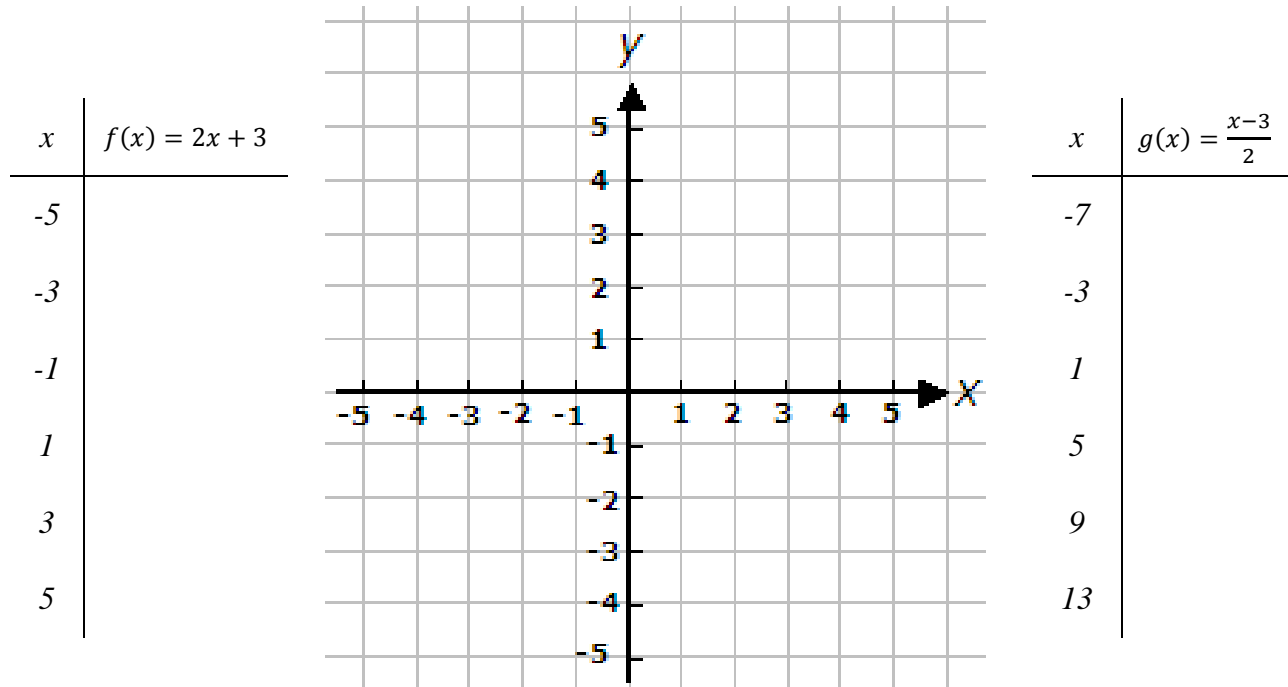
1] Find the inverse of  $f(x) = 5x - 10$ .

2] Find the inverse of  $f(x) = \frac{3x+2}{2}$ .

3] Find the inverse of  $f(x) = \frac{1}{2}x + \frac{3}{2}$ .

4] Find the inverse of  $f(x) = x^3 + 2$

Complete the tables of ordered pairs for  $f(x)$  and  $g(x)$ . Then sketch the graph of  $f(x)$  in red and  $g(x)$  in blue.

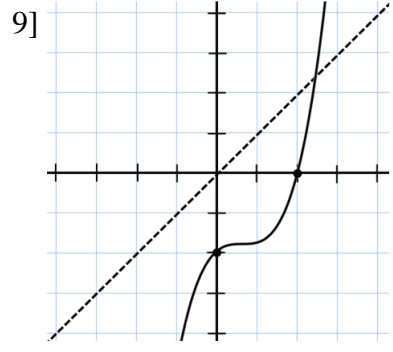
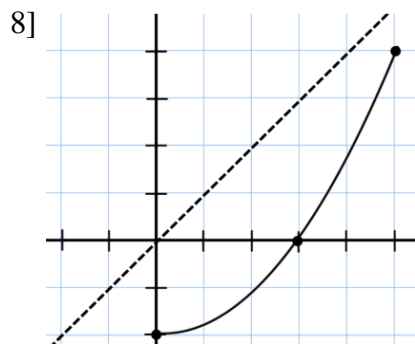
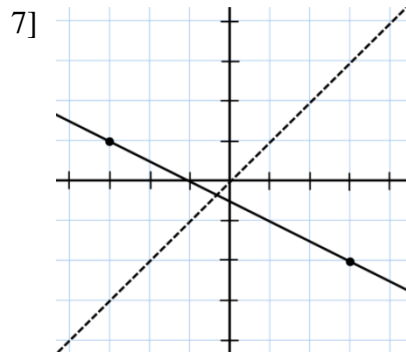


5] What is the relationship between the ordered pairs of  $f(x)$  and the ordered pairs of  $g(x)$ ?

Trace over the red and blue lines onto the patty paper square. Then fold the patty paper so that the red line lies perfectly on top of the blue line. Crease the paper. Trace over the fold line in green.

6] How are the graphs of  $f(x)$  and  $g(x)$  related to the green line  $y = x$ ?

Sketch the inverse of the functions graphed below.



$$f(x) = 2x + 3 \text{ and } g(x) = \frac{x-3}{2}$$

Find the compositions  $(f \circ g)(x)$  and  $(g \circ f)(x)$ . Show your work.

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

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

10] What do you notice?

Show that  $f(x)$  and  $g(x)$  are inverses using function composition.

$$11] f(x) = 5x - 10 \text{ and } g(x) = \frac{1}{5}x + 2$$

$$12] f(x) = \frac{3}{2}x + 1 \text{ and } g(x) = \frac{2}{3}x - \frac{2}{3}$$

$$13] f(x) = \frac{1}{2}x + \frac{3}{2} \text{ and } g(x) = 2x - 3$$

$$14] f(x) = x^3 + 2 \text{ and } g(x) = \sqrt[3]{x-2}$$

PRACTICE

---

15] Find the inverse of  $f(x) = 3x + 2$ .

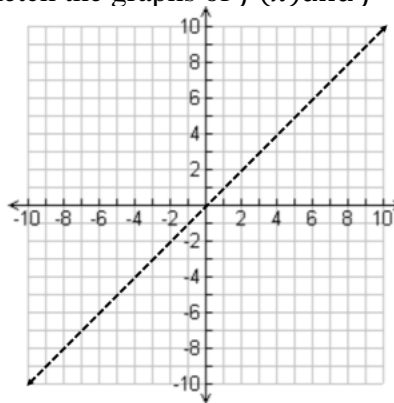
Complete the tables of values.

$x$	$f(x)$	$x$	$f^{-1}(x)$
-3		-7	
-2		-4	
-1		-1	
0		2	
1		5	
2		8	
3		11	

Show your work for each function composition.

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

Sketch the graphs of  $f(x)$  and  $f^{-1}(x)$ .



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

16] Find the inverse of  $f(x) = x^3 - 3$ .

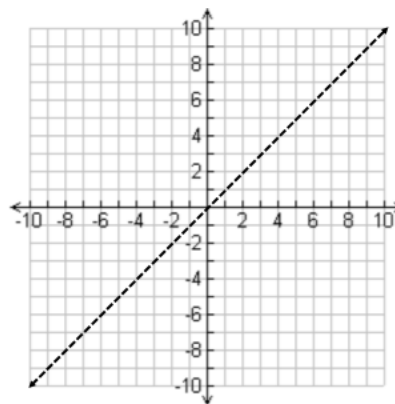
Complete the tables of values.

$x$	$f(x)$	$x$	$f^{-1}(x)$
-2		-11	
-1		-4	
0		-3	
1		-2	
2		5	

Show your work for each function composition.

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

Sketch the graphs of  $f(x)$  and  $f^{-1}(x)$ .



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