NAME Answer Key DATE _____ PERIOD _____

6.2 - Inverse Relations and Functions · Form A

All work must be completed on a separate sheet of paper, in a clear and organized manner. Final answers only on WS.

Example 1

For each polygon, find the inverse of the relation. Then, graph both the original relation and its inverse.

1. $\triangle XYZ$ with vertices at {(7, 7), (4, 9), (3, −7)} {(7,7), (9,4), (−7,3)}

2. quadrilateral *FGHJ* with vertices at {(4, 3), (−4, −4), (−3, −5), (5, 2)} {(3,4) (−4,−4) (−5,−3) (2,5)}

Examples 2 and 3

Find the inverse of each function. Then graph the function and its inverse. If necessary, restrict the domain of the inverse so that it is a function.

3. $g(x) = 5x$ $g'(x) = \frac{1}{5}x$

4. $h(x) = \frac{x-4}{3}$ $h'(x) = 3x+4$

5. $g(x) = x + 4$ $g'(x) = x - 4$

6. $f(x) = -8x + 9$ $f'(x) = -\frac{1}{8}x + \frac{9}{8}$

7. $h(x) = x^2 + 4$ $h'(x) = \pm\sqrt{x-4}$

Example 4

8. **CRYPTOGRAPHY** DeAndre is designing a code to send secret messages. He assigns each letter of the alphabet to a number, where A = 1, B = 2, C = 3, and so on. Then he uses $c(x) = 4x - 9$ to create the secret code.

a. Find the inverse of $c(x)$, and describe its meaning. $c^{-1}(x) = \frac{1}{4}x + \frac{9}{4}$

b. Make tables of $c(x)$ and $c^{-1}(x)$. Use the table to decipher the message: 15, 75, 47, 3, 71, 27, 51, 47, 67. Functions

Examples 5

Determine whether each pair of functions are inverse functions. Write *yes* or *no*.

9. $f(x) = 2x + 3$
$g(x) = \frac{1}{2}(x - 3)$ yes

10. $f(x) = 2x$
$g(x) = \frac{1}{2}x$ yes

11. $f(x) = 8x - 10$
$g(x) = \frac{1}{8}x + \frac{5}{4}$ yes

Examples 6

12. **GEOMETRY** The formula for the area of a trapezoid is $A = \frac{h}{2}(a + b)$. Determine whether $h = 2A - (a + b)$ is the inverse of the original function. no

Mixed Exercises

Find the inverse of each function. Then graph the function and its inverse. If necessary, restrict the domain of the inverse so that it is a function.

13. $f(x) = 3x$ $f^{-1}(x) = \frac{1}{3}x$

14. $g(x) = 2x - 1$ $g'(x) = \frac{1}{2}x + \frac{1}{2}$

15. $f(x) = (x + 1)^2 + 3$
$f^{-1}(x) = \pm\sqrt{x-3} - 1$

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Determine whether each pair of functions are inverse functions. Write *yes* or *no*.

16. $f(x) = \frac{1}{3}x^2 + 1$

$g(x) = \sqrt{3x - 3}$ yes

17. $f(x) = \frac{2}{3}x^3$

$g(x) = \sqrt{\frac{2}{3}x}$ no

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

$g(x) = \frac{1}{4}x^2 - 5$ no

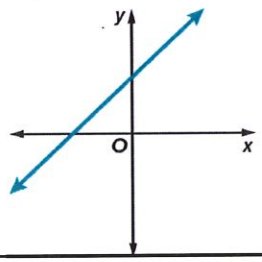
~~**Restrict the domain of $f(x)$ so that its inverse is also a function. State the restricted domain of $f(x)$ and the domain of $f^{-1}(x)$.**~~

~~**19.** $f(x) = 3x^2$~~

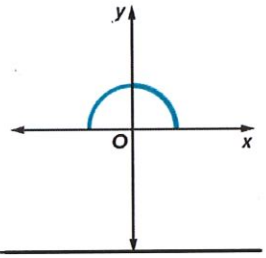
~~**20.** $f(x) = \sqrt{x + 3}$~~

~~**Sketch a graph of the inverse of each function. Then state whether the inverse is a function.**~~

~~**21.**~~



~~**22.**~~



~~**23.** Graph the inverse of the piecewise function shown.~~

~~**24.** Use the table to find the relationship between $(f + g)^{-1}(x)$ and $f^{-1}(x) + g^{-1}(x)$.~~

x	0	1	2	3
$f(x)$	0	3	1	4
$g(x)$	1	0	4	3

~~**a.** Suppose that functions $f(x)$, $g(x)$, and $(f + g)(x)$ all have inverse functions defined on the domain [0, 3]. Calculate the following values.~~

~~**i.** $f^{-1}(3) + g^{-1}(3) =$~~ ~~**ii.** $f^{-1}(1) + g^{-1}(1) =$~~

~~**b.** Use the value of $(f + g)(1)$ to find $(f + g)^{-1}(3)$. Use the value of $(f + g)(0)$ to find $(f + g)^{-1}(1)$.~~

~~**c.** Joyce claims that $(f + g)^{-1}(x) = f^{-1}(x) + g^{-1}(x)$. Determine whether she is correct. Explain your reasoning.~~

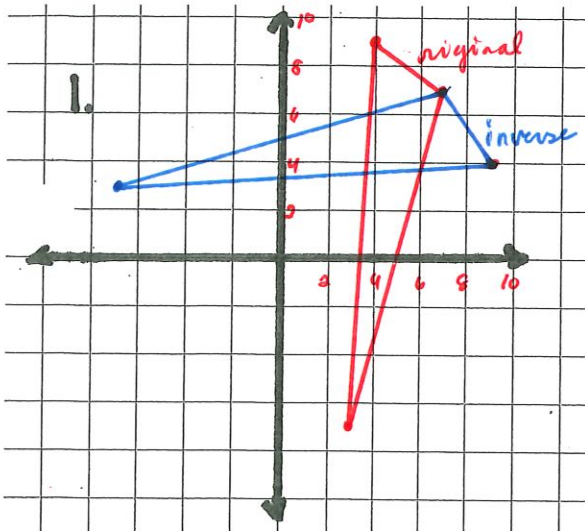
~~**d.** Consider the functions $f(x) = 2x + 1$ and $g(x) = 2x - 1$. Compare $(f + g)^{-1}(x)$ and $f^{-1}(x) + g^{-1}(x)$.~~

~~**25.** **ANALYZE** If a relation is not a function, then its inverse is *sometimes*, *always*, or *never* a function. Justify your argument.~~

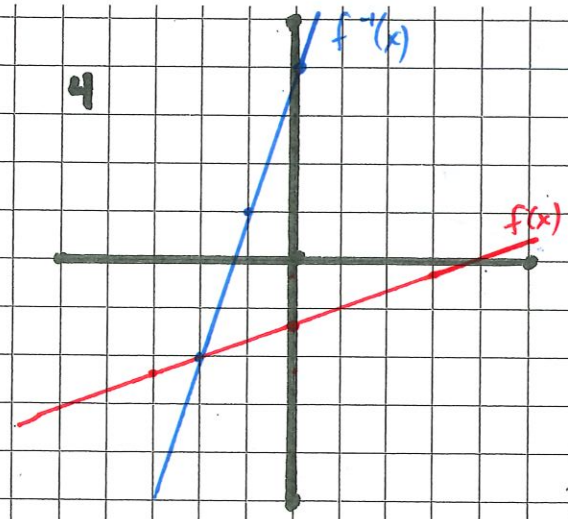
~~**26.** **PERSEVERE** Give an example of a function that is its own inverse.~~

~~**27.** **WRITE** Suppose you have a composition of two functions that are inverses. When you put in a value of 5 for x, why is the result always 5?~~

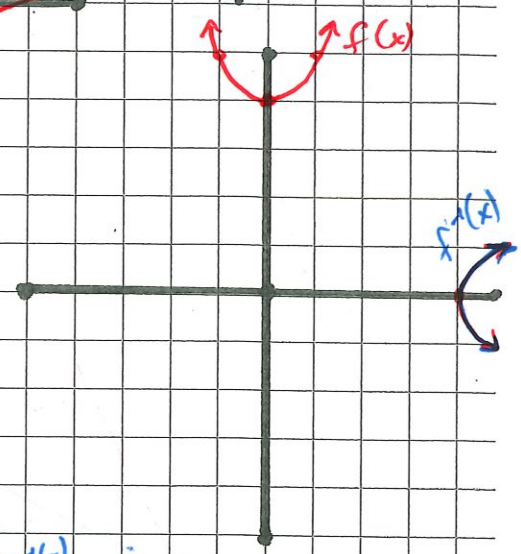
1.


original
inverse
10
8
6
4
2
2
4
6
8
10

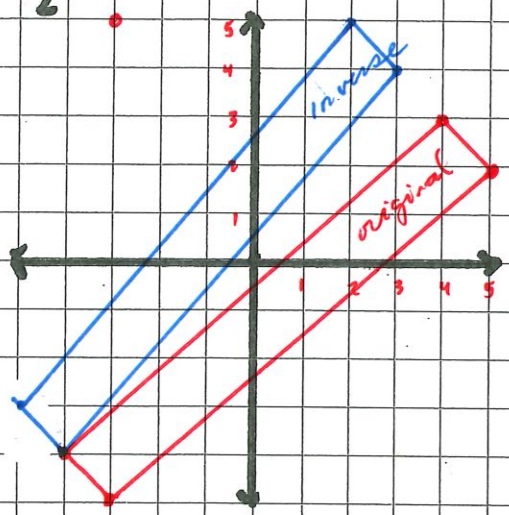
4


$f^{-1}(x)$
$f(x)$

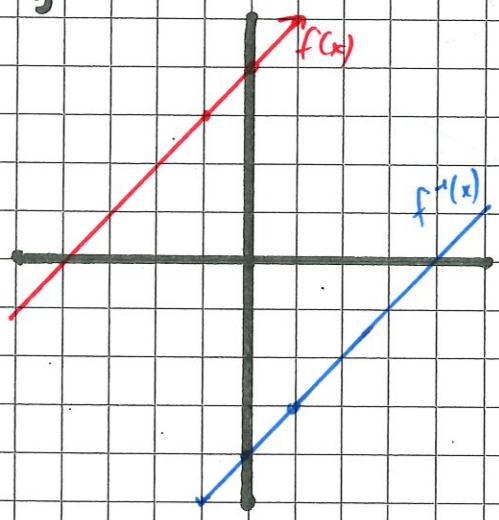
7.


$f(x)$
$f^{-1}(x)$

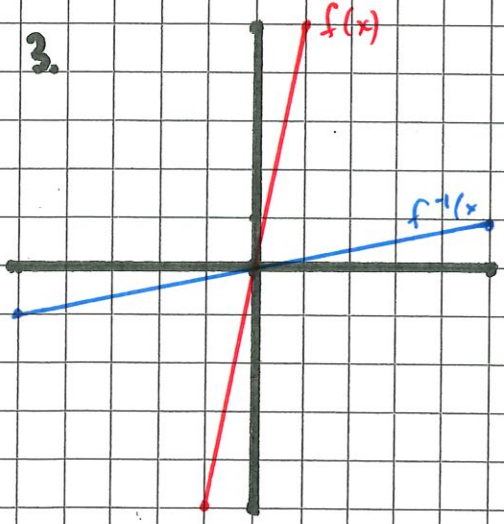
2


inverse
original
5
4
3
2
1
1
2
3
4
5

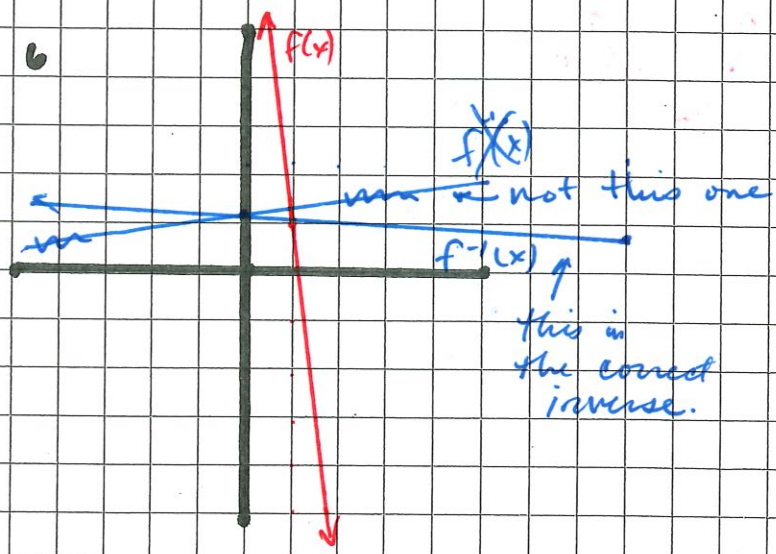
5


$f(x)$
$f^{-1}(x)$

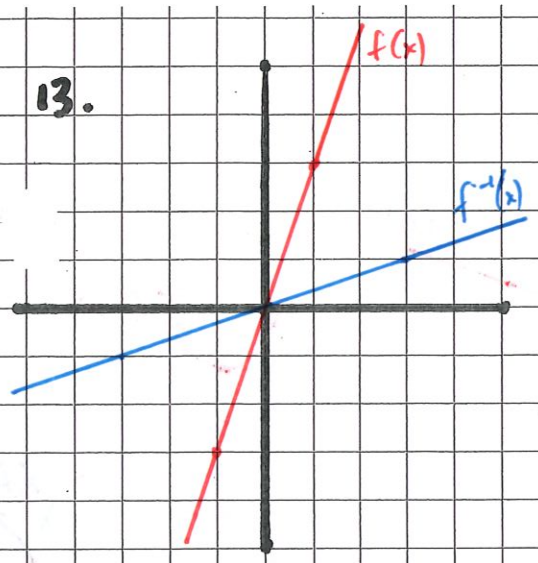
3.


$f(x)$
$f^{-1}(x$

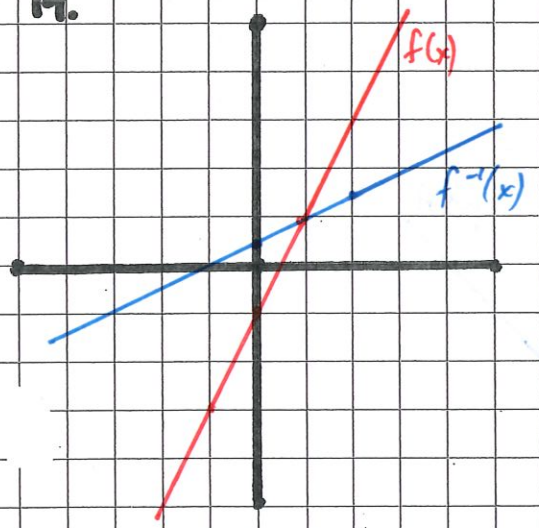
6


$f(x)$
$f^{-1}(x)$
not this one
$f^{-1}(x)$
this is the correct inverse.

13.



14.



15.