

6-7

Practice

Form K

Inverse Relations and Functions

Find the inverse of each relation. Graph the given relation and its inverse.

1.

x	y
0	-1
1	1
2	3
3	5

2.

x	y
-2	7
0	3
2	7
4	19

3.

x	y
-3	2
-2	2
-1	2
0	2

Find the inverse of each function. Is the inverse a function? To start, switch x and y .

4. $y = \frac{x}{2}$
 $x = \frac{y}{2}$

5. $y = x^2 + 4$

6. $y = (3x - 4)^2$

Graph each relation and its inverse.

7. $y = 3x - 4$

8. $y = -x^2$

9. $y = (3 - 2x)^2$

6-7

Practice (continued)

Form K

Inverse Relations and Functions

Find the inverse of each function. Is the inverse a function?

10. $f(x) = (x + 1)^2$

11. $f(x) = \frac{2x^3}{5}$

12. $f(x) = \sqrt{3x} + 4$

13. **Multiple Choice** What is the inverse of $y = 5x - 1$?

Ⓐ $f^{-1}(x) = 5x + 1$ Ⓑ $f^{-1}(x) = \frac{x+1}{5}$ Ⓒ $f^{-1}(x) = \frac{x}{5} + 1$ Ⓓ $f^{-1}(x) = \frac{x}{5} - 1$

For each function, find its inverse and the domain and range of the function and its inverse. Determine whether the inverse is a function.

14. $f(x) = \sqrt{x + 1}$

15. $f(x) = 10 - 3x$

16. $f(x) = 4x^2 + 25$

17. The formula for the area of a circle is $A = \pi r^2$.

a. Find the inverse of the formula. Is the inverse a function?

b. Use the inverse to find the radius of a circle that has an area of 82 in.^2 .For Exercises 18–20, $f(x) = 5x + 11$. Find each value. To start, rewrite $f(x)$ as y and switch x and y .

18. $(f \circ f^{-1})(5)$

19. $(f^{-1} \circ f)(-3)$

20. $(f^{-1} \circ f)(0)$

$y = 5x + 11$

6-7

Reteaching

Inverse Relations and Functions

- Inverse operations “undo” each other. Addition and subtraction are inverse operations. So are multiplication and division. The inverse of cubing a number is taking its cube root.
- If two functions are inverses, they consist of inverse operations performed in the opposite order.

Problem

What is the inverse of the relation described by $f(x) = x + 1$?

$$f(x) = x + 1$$

$$y = x + 1$$

Rewrite the equation using y , if necessary.

$$x = y + 1$$

Interchange x and y .

$$x - 1 = y$$

Solve for y .

$$y = x - 1$$

The resulting function is the inverse of the original function.

So, $f^{-1}(x) = x - 1$.

Exercises

Find the inverse of each function.

1. $y = 4x - 5$

2. $y = 3x^3 + 2$

3. $y = (x + 1)^3$

4. $y = 0.5x + 2$

5. $f(x) = x + 3$

6. $f(x) = 2(x - 2)$

7. $f(x) = \frac{x}{5}$

8. $f(x) = 4x + 2$

9. $y = x$

10. $y = x - 3$

11. $y = \frac{x - 1}{2}$

12. $y = x^3 - 8$

13. $f(x) = \sqrt{x + 2}$

14. $f(x) = \frac{2}{3}x - 1$

15. $f(x) = \frac{x + 3}{5}$

16. $f(x) = 2(x - 5)^2$

17. $y = \sqrt{x} + 4$

18. $y = 8x + 1$

