Name _____ Date _____

5.6 Inverse of a Function

For use with Exploration 5.6

Essential Question How can you sketch the graph of the inverse of a function?

1 EXPLORATION: Graphing Functions and Their Inverses

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Each pair of functions are *inverses* of each other. Use a graphing calculator to graph f and g in the same viewing window. What do you notice about the graphs?

a. $f(x) = 4x + 3$

$g(x) = \frac{x - 3}{4}$

b. $f(x) = x^3 + 1$

$g(x) = \sqrt[3]{x - 1}$

c. $f(x) = \sqrt{x - 3}$

$g(x) = x^2 + 3, x \geq 0$

d. $f(x) = \frac{4x + 4}{x + 5}$

$g(x) = \frac{4 - 5x}{x - 4}$

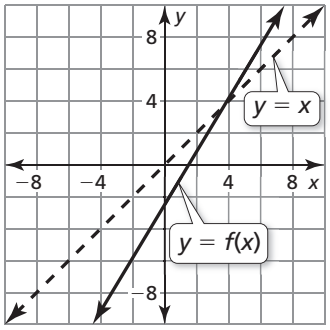
5.6 Inverse of a Function (continued)

2 EXPLORATION: Sketching Graphs of Inverse Functions

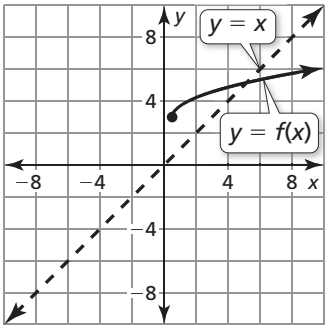
Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use the graph of f to sketch the graph of g, the inverse function of f, on the same set of coordinate axes. Explain your reasoning.

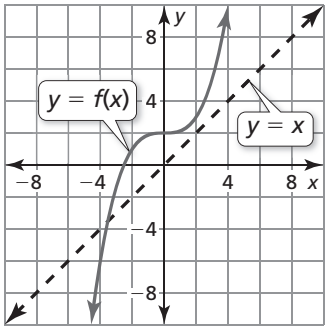
a.



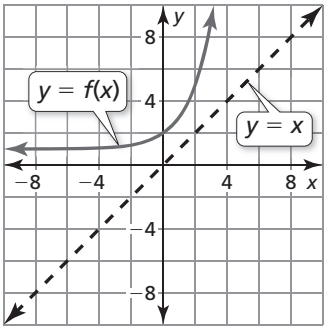
b.



c.



d.



Communicate Your Answer

3. How can you sketch the graph of the inverse of a function?

4. In Exploration 1, what do you notice about the relationship between the equations of f and g? Use your answer to find g, the inverse function of

$$f(x) = 2x - 3.$$

Use a graph to check your answer.

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5.6 Notetaking with Vocabulary

For use after Lesson 5.6

In your own words, write the meaning of each vocabulary term.

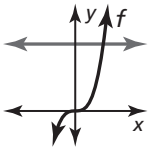
inverse functions

Core Concepts

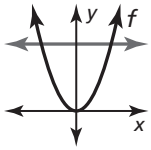
Horizontal Line Test

The inverse of a function f is also a function if and only if no horizontal line intersects the graph of f more than once.

Inverse is a function



Inverse is not a function



Notes:

Name_____ Date _____

5.6 Notetaking with Vocabulary (continued)

Extra Practice

In Exercises 1–3, solve $y = f(x)$ for x. Then find the input(s) when the output is -6.

1. $f(x) = 2x - 1$

2. $f(x) = 1 - x^2$

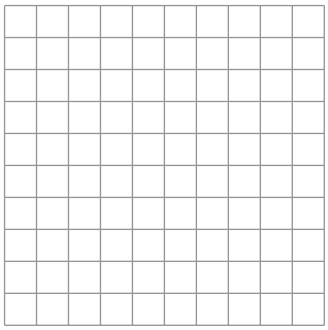
3. $f(x) = (x - 1)^3 + 2$

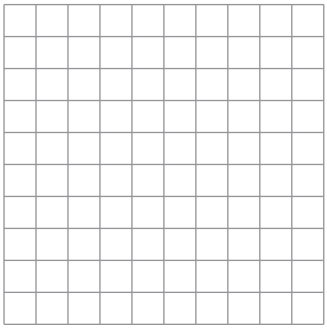
In Exercises 4–6, find the inverse of the function. Then graph the function and its inverse.

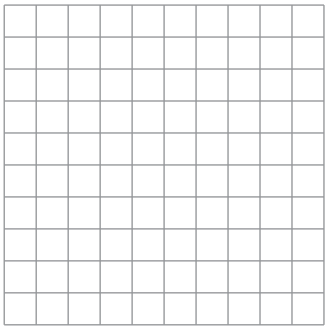
4. $f(x) = 10x$

5. $f(x) = -\frac{1}{5}x - 7$

6. $f(x) = \frac{3}{4}x + \frac{5}{8}$







In Exercises 7 and 8, determine whether each pair of functions f and g are inverses. Explain your reasoning.

7.

x	-4	-3	-2	-1	0	1
$f(x)$	17	13	9	5	1	-3

x	17	13	9	5	1	-3
$g(x)$	-4	-3	-2	-1	0	-1

8.

x	1	2	3	4	5	6
$f(x)$	-1	-2	-4	-5	-8	-10

x	-1	-0.5	-0.25	-0.2	-0.125	-0.1
$g(x)$	1	2	3	4	5	6

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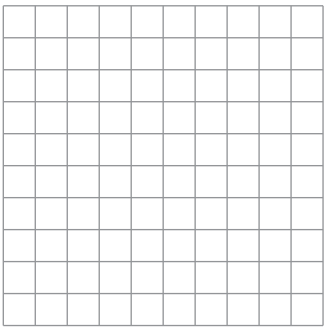
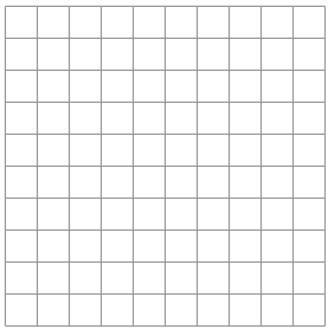
5.6 Notetaking with Vocabulary (continued)

In Exercises 9 and 10, find the inverse of the function. Then graph the function and its inverse.

9. $f(x) = (x + 2)^3$

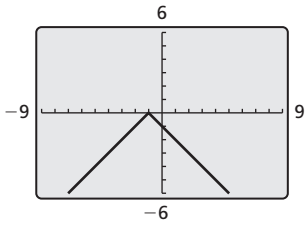


10. $f(x) = \frac{1}{3}x^4, x \geq 0$

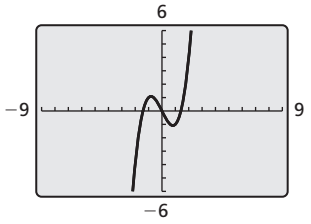


In Exercises 11 and 12, use the graph to determine whether the inverse of *f* is a function. Explain your reasoning.

11.



12.



In Exercises 13 and 14, determine whether the functions are inverses.

13. $f(x) = \frac{4x}{5} - 1, g(x) = \frac{5x + 1}{4}$

14. $f(x) = -(x - 2)^5 + 6, g(x) = 2 + (6 - x)^{1/5}$