Algebra 2 Name: ______________________________
Inverse Functions Day 2 Date: __________________

YES/NO Is the inverse a function? Does the function pass the Horizontal Line Test (HLT)? Use a calculator to find the answer.

1. $f(x) = -x^3 + 3$	2. $f(x) = \sqrt{x-6}$
3. $f(x) = 2x^2 - 5$	4. $f(x) = 2x^3 - 5$
5. $f(x) = -\sqrt[3]{\left(\frac{2x+4}{3}\right)}$	6. $f(x) = -3\sqrt{\frac{4x-7}{3}}$

YES/NO Are these functions inverses of each other? Do they reflect over the line $y = x$? Use a calculator to find the answer.

7. $f(x) = 2x - 9$ and $g(x) = \frac{x}{2} - 9$	8. $f(x) = \frac{x-3}{4}$ and $g(x) = 4x + 3$
9. $f(x) = \sqrt[5]{\frac{x+9}{5}}$ and $g(x) = 5x^5 - 9$	10. $f(x) = 7x^{\frac{3}{2}} - 4$ and $g(x) = \left(\frac{x+4}{7}\right)^{\frac{3}{2}}$

11. **REASONING** Determine whether each pair of functions f and g are inverses. Explain your reasoning.

a.

x	−2	−1	0	1	2
$f(x)$	−2	1	4	7	10

x	−2	1	4	7	10
$g(x)$	−2	−1	0	1	2

b.

x	2	3	4	5	6
$f(x)$	8	6	4	2	0

x	2	3	4	5	6
$g(x)$	−8	−6	−4	−2	0

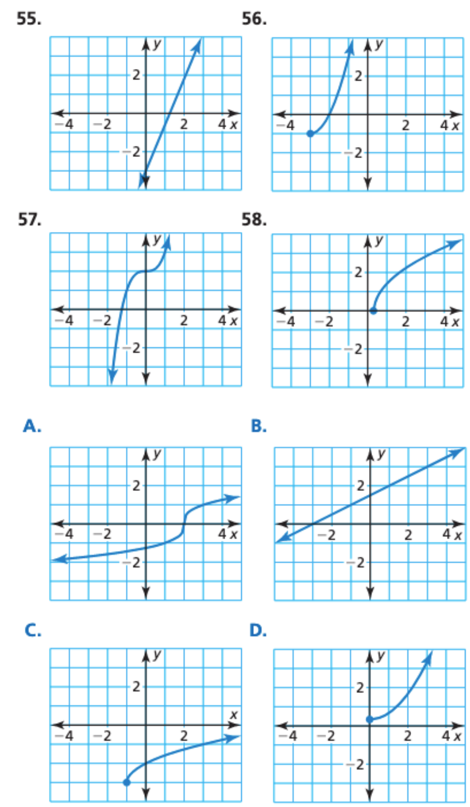
c.

x	−4	−2	0	2	4
$f(x)$	2	10	18	26	34

x	−4	−2	0	2	4
$g(x)$	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{18}$	$\frac{1}{26}$	$\frac{1}{34}$

12. Match the graph of the function to its inverse.

ANALYZING RELATIONSHIPS In Exercises 55–58, match the graph of the function with the graph of its inverse.



Algebra 2
NOTES: Inverse Functions Day 2

Name: ____________________
Date: __________

Notice that these steps *undo* each other. Functions that undo each other are called **inverse functions**. In Example 1, you can use the equation solved for x to write the inverse of f by switching the roles of x and y.

$f(x) = 2x + 3$ original function $\qquad g(x) = \dfrac{x-3}{2}$ inverse function

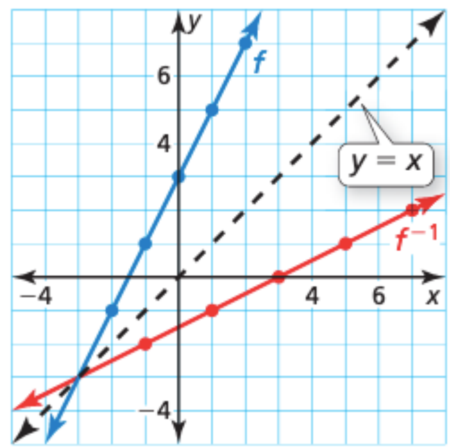
The function g is denoted by f^{-1}, read as "f inverse." Because inverse functions interchange the input and output values of the original function, the domain and range are also interchanged.

Original function: $f(x) = 2x + 3$

x	−2	−1	0	1	2
y	−1	1	3	5	7

Inverse function: $f^{-1}(x) = \dfrac{x-3}{2}$

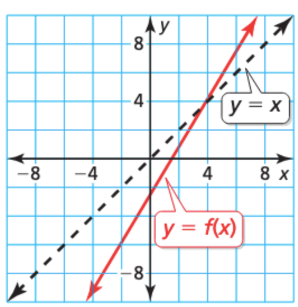
x	−1	1	3	5	7
y	−2	−1	0	1	2



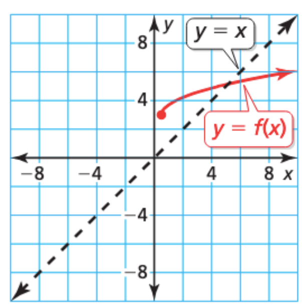
The graph of an inverse function is a *reflection* of the graph of the original function. The *line of reflection* is $y = x$. To find the inverse of a function algebraically, switch the roles of x and y, and then solve for y.

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.

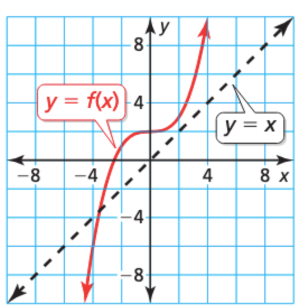
a.



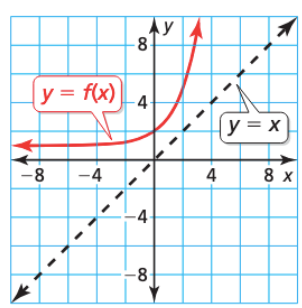
b.



c.



d.



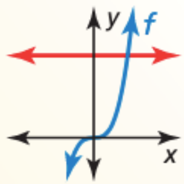
Horizontal Line Test

You can use the graph of a function *f* to determine whether the inverse of *f* is a function by applying the *horizontal line test*.

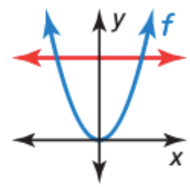
Horizontal Line Test

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

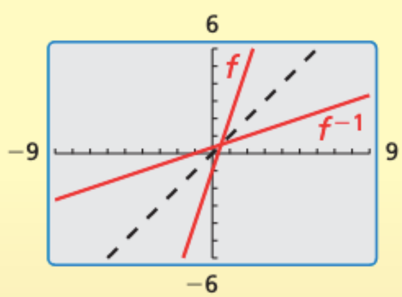


Inverse is not a function



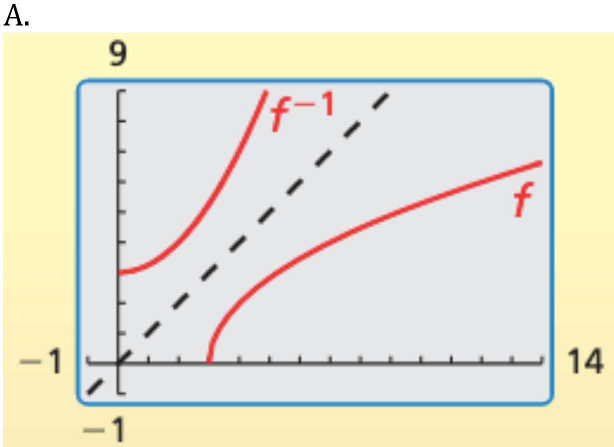
Are these functions inverses? Why?

Example:



The graph of f^{-1} appears to be a reflection of the graph of *f* in the line $y = x$.

A.



B.