

Algebra 2 6.2

$X \leftrightarrow y$

Find the inverse of a function or relation

Determine whether two functions or relations are inverses
relation

function

Quiz Tues. 6.1-6.2

inverse

vertical line test VLT is it a function?

horizontal line test HLT is the inv. a function

one to one function

identity function $y=x$

whiteboards?

$$y = |x| + 0$$

 **KeyConcept** Inverse Relations

Words Two relations are inverse relations if and only if whenever one relation contains the element (a, b) , the other relation contains the element (b, a) .

Example A and B are inverse relations.

$$A = \{(1, 5), (2, 6), (3, 7)\} \qquad B = \{(5, 1), (6, 2), (7, 3)\}$$

Find the inverse from ordered pairs:

Find the inverse from an equation:

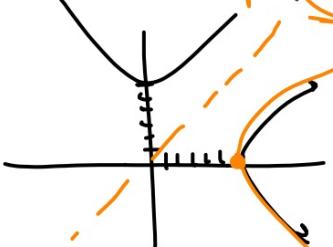
$$f(x) = x^2 + 6$$

$$y = x^2 + 6$$

$$x = y^2 + 6$$

$$\sqrt{x-6} = \sqrt{y^2}$$

$$\pm \sqrt{x-6} = y$$

$$f^{-1}(x) = \pm \sqrt{x-6}$$


Are they inverses?

KeyConcept Inverse Functions

Words Two functions f and g are inverse functions if and only if both of their compositions are the identity function.

Symbols $f(x)$ and $g(x)$ are inverses if and only if $[f \circ g](x) = x$ and $[g \circ f](x) = x$.

WatchOut!

Inverse Functions Be sure to check both $[f \circ g](x)$ and $[g \circ f](x)$ to verify that functions are inverses. By definition, both compositions must be the identity function.

$$y = \sqrt{2x+2}$$

$$y =$$

Are their compositions (both ways) = identity function?
If you find the inverse of one of them = the other one?

Example 3 Verify that Two Functions are Inverses

Determine whether each pair of functions are inverse functions. Explain your reasoning.

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

(Comp)

$$(f \circ g)(x) = x \rightarrow \boxed{\frac{1}{3}(\quad) - 3} \xrightarrow{3x-3} \boxed{.3(\frac{1}{3}x-3) + 9} = x$$

Same

$$(g \circ f)(x) = x \rightarrow \boxed{3(x) + 9} \xrightarrow{3x+9} \boxed{\frac{1}{3}(3x+9) - 3} = x$$

Are both compositions = identity function?

Guided Practice

3A. $f(x) = 3x - 3, g(x) = \frac{1}{3}x + 4$

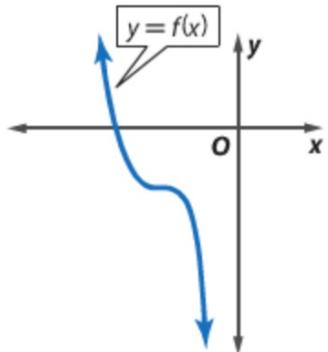
$$3B. f(x) = 2x^2 - 1, g(x) = \sqrt{\frac{x+1}{2}}$$

$$\sqrt{2x^2 - 1} \quad \sqrt{x^2}$$

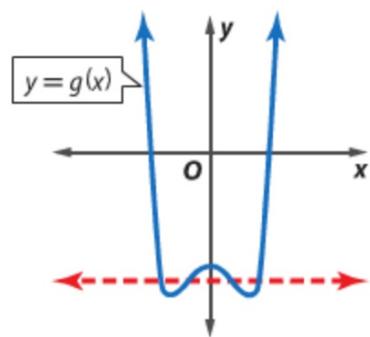
$$(f \circ g)(x) = \sqrt{\frac{(x+1)}{2}} \rightarrow 2\left(\sqrt{\frac{x+1}{2}}\right)^2 - 1, \quad x = x$$

"same" value

$$(g \circ f)(x) = 2(x)^2 - 1 \xrightarrow{2x^2 - 1} \sqrt{\frac{2x^2 - 1 + 1}{2}} = x$$



VLT
HLT



W B 6. 2