Algebra 2   6.2 $X \iff y$
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) $y = 1x + 0$
whiteboards?

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:
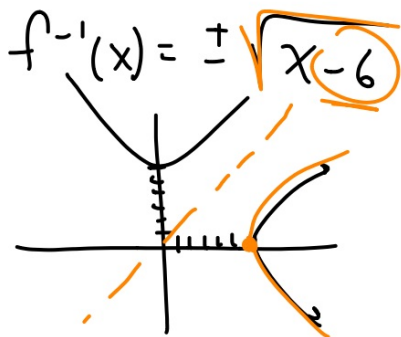Find the inverse from an equation:

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

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

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

Are they inverses?

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

$$y =$$

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. $\left(\text{Comp}\right)$

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

$\left(f \circ g\right)(x) = $ g $x \to \boxed{\frac{1}{3}(\ ) - 3}$ $\frac{1}{3}x - 3 \to$ f $\boxed{3\left(\frac{1}{3}x - 3\right) + 9 \quad x - 9 + 9} = x$

$\left(g \circ f\right)(x) = x \to \boxed{\underline{3(x) + 9}}$ $3x + 9 \to$ g $\boxed{\frac{1}{3}(3x + 9) - 3 \quad x + 3 - 3} = x$

Same
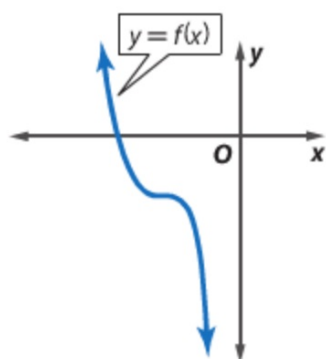
Are both compositions = identity function?

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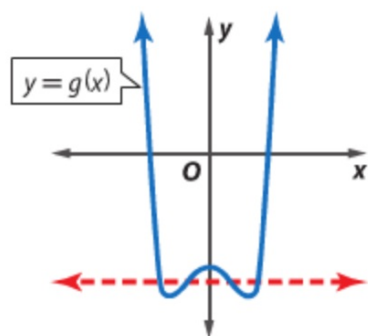
3A. $f(x) = 3x - 3,\ g(x) = \frac{1}{3}x + 4$

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

$\sqrt{\dfrac{2x^2}{7}}$ $\sqrt{x^2}$

$(f \circ g)(x) \overset{x}{=} \boxed{\sqrt{\dfrac{(x)+1}{2}}} \rightarrow \boxed{2\left(\sqrt{\dfrac{x+1}{2}}\right)^2 - 1 \quad 2 \cdot \dfrac{x+1}{2} - 1} = x \right] \text{same} = \text{yes}$

$(g \circ f)(x) \overset{x \rightarrow}{=} \boxed{2(x)^2 - 1} \xrightarrow{2x^2 - 1} \boxed{\sqrt{\dfrac{2x^2 - 1 + 1}{2}}} = x$

VLT
HLT

WB 6.2