Cornell Notes	Topic/Objective: 1-5 Inverses (continued)	Name:
AVID		Class/Period: 4th
		Date: 10/21/16

Essential Question: How do we find ~~those~~ the inverse of a function algebraically?

Questions:	Notes:

Inverses "undo" each other

$f(x) = 3x - 2$

$x \xrightarrow{\cdot 3} \xrightarrow{-2} 3x-2$ (3x, 3x-2)

$\frac{x+2}{3} \xleftarrow{\div 3} \xleftarrow{+2} x$ ($x+2$)

Algebraically
- Replace y's with x and x with y, then solve for y

Example – given $f(x) = 3x - 2$, find $f^{-1}(x)$

replace $f(x)$ with y

$y = 3x - 2$

$x = 3y - 2$ $\quad x \leftrightarrow y$

$x + 2 = 3y$ $\quad$ solve for y

$\frac{x+2}{3} = y$ $\quad$ replace with $f^{-1}(x)$

$f^{-1}(x) = \frac{x+2}{3}$

Questions:	Notes:
$\frac{1}{2}x + 3 = 2$	You try: Find $f^{-1}(x)$ for $f(x) = \frac{10}{x+7}$

$$y = \frac{10}{x+7}$$

$$(y+7)\cdot x = \frac{10}{(y+7)}\cdot(y+7)$$

$$x(y+7)$$

$$xy + 7x = 10$$

$$\frac{xy}{x} = \frac{10-7x}{x}$$

$$f^{-1}(x) = y = \frac{10-7x}{x} = \frac{10}{x} - \frac{7x}{x}$$

OR

$$(y+7)\cdot x = 10$$

$$y+7 = \frac{10}{x}$$

$$= \frac{10}{x} - 7$$

$$y = \frac{10}{x} - \frac{7x}{x} = \frac{10-7x}{x}$$

Questions:	Notes:
$f(x) =$ $g(x) =$ $(f \circ g^{-1})(x)$	How do we know $f(x)$ and $g(x)$ are inverses of each other? $(f \circ f^{-1})(x) = x$ $(f^{-1} \circ f)(x) = x$ Check our last example: $f(x) = \frac{10}{x+7}$ $\quad f^{-1}(x) = \frac{10}{x} - 7$ $(f \circ f^{-1})(x) = f(f^{-1}(x)) = f\left(\frac{10}{x} - 7\right)$ input $= \frac{10}{\left(\frac{10}{x} - 7\right) + 7} = \frac{10}{\frac{10}{x} - 7 + 7}$ $= \frac{10}{\frac{10}{x}} \cdot \frac{x}{x}$ $= \frac{10x}{\frac{10x}{x}}$ $= \frac{10x}{10}$ $= x$ ✓ $10 \cdot \frac{x}{10} = x$ $\frac{10}{x} \cdot \frac{x}{10} = 1$ $10 \div \frac{10}{x}$ $10 \cdot \frac{x}{10} = x$ $(f^{-1} \circ f)(x) = x$? EVALUATE $f(5)$ and $f^{-1}(5)$ $f(5) = \frac{10}{(5)+7} = \frac{10}{12} = \frac{5}{6}$ $f^{-1}(5) = \frac{10}{(5)} - 7 = 2 - 7 = -5$ $f^{-1}\left(\frac{5}{6}\right) = \frac{10}{\frac{5}{6}} - 7 = \frac{60}{5} - 7$ $= 12 - 7 = 5$

$f(5) = \frac{5}{6}$ $\quad \left(5, \frac{5}{6}\right)$

$f\left(\frac{5}{6}\right) = 5$ $\quad \left(\frac{5}{6}, 5\right)$

HW p20 1, 2bch, #4