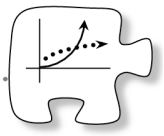
CW#___ Name:_____

5.1.3 What can I do with inverses?



More Inverse Functions

#40 Write the inverse function of the following functions, clearly showing all your steps.

a.

Solve using a Do/Undo table

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

Do	
Undo	

$f^{-1}(x) =$

Solve Algebraically

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

$f^{-1}(x) =$

b.

Solve using a Do/Undo table

$f(x) = 3\left(\frac{x-9}{2}\right) + 20$

Do	
Undo	

$f^{-1}(x) =$

Solve Algebraically

$f(x) = 3\left(\frac{x-9}{2}\right) + 20$

$f^{-1}(x) =$

#41 Adriena's strategy for checking that the functions $f(x)$ and $f^{-1}(x)$ are inverses of each other is to think of them as stacked function machines. She starts by choosing a number to drop into $f(x)$. Then she drops the output from $f(x)$ into $f^{-1}(x)$. If she gets her original number, she is pretty sure that the two functions are inverses.

a. With your team, using the pair of inverse functions from problem #40 (a), test Adriena's ideas.

b. Adriena wants to show her work algebraically. She knows that if she chooses her input for $f(x)$ to be 3, she can write the output as $f(3)$. Next, $f(3)$ becomes the input for $f^{-1}(x)$, and her output is 3. Since $f(3)$ is the new input for $f^{-1}(x)$, she thinks that she can write this process as $f^{-1}(f(3)) = 3$. Does her idea make sense? Why or why not?

c. Does Adriena's strategy confirm the functions are inverses of each other? Is there anything else she should check?

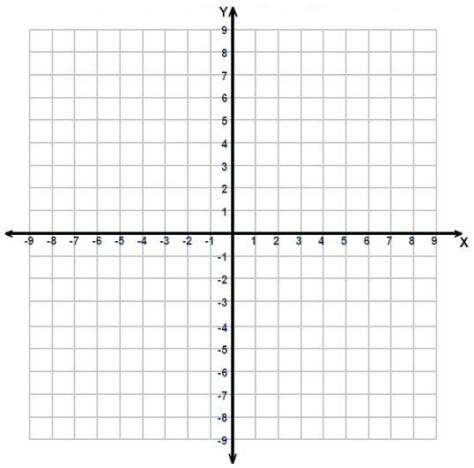
d. Use your strategy from part (c) to confirm that $f(x)$ is the inverse of $f^{-1}(x)$. Write an equation that expresses your results algebraically using the notation from part (b).

e. Will this strategy for testing inverses work with any input?

#42 Adriena had to find the inverse function of $f(x) = (x - 3)^2 + 2$. She got the equation $f^{-1}(x) = \sqrt{x-2} + 3$. Will her stacked function machine method work?

a. Adriena's friend Cemetra decided to check $f^{-1}(f(-5))$. What happened? Why did this happen?

b. How can you restrict the domain of $f(x)$ to make sure the functions are inverses of each other? Sketch a graph of the function and the inverse to confirm your answer.



#43 Adriena and Statler are writing inverses of some other functions. They come up with these inverse pairs:

i. $f(x) = \frac{3}{5}x - 15$
$g(x) = \frac{5}{3}x + 25$

ii. $j(x) = \frac{2}{x} + 10$
$k(x) = \frac{2}{x-10}$

iii. $e(x) = \frac{(x-10)^2}{4}$
$d(x) = 4\sqrt{x} + 10$

iv. $m(x) = 2(x-1)^3 + 7$
$p(x) = \sqrt[3]{\frac{x-1}{2}} + 7$

a. Name three different methods Adriena and Statler can use to verify that these pairs of functions are actually inverses.

#43 Continued

b. Help Adriena and Statler verify whether these pairs of functions are really inverses of each other by using a composition of functions $f(f^{-1}(x))$ or $f^{-1}(f(x))$. If they are not, explain what went wrong and write the inverse function correctly. State the domains and ranges necessary to make each pair of functions inverses of each other.

i. $f(x)=\frac{3}{5}x-15$
$g(x)=\frac{5}{3}x+25$

ii. $j(x)=\frac{2}{x}+10$
$k(x)=\frac{2}{x-10}$

iii. $e(x)=\frac{(x-10)^2}{4}$
$d(x)=4\sqrt{x}+10$

iv. $m(x)=2(x-1)^3+7$
$p(x)=\sqrt[3]{\frac{x-1}{2}}+7$

i.

ii.

iii.

iv.