AAT Name ____________________________

3-8 Inverses of Functions Date ______________________ **A#15**

Goal: Find an inverse of a function from a graph or equation.

Questions

Warm Up: Indicate how you could undo each operation or composite of functions.

1. Turning left and walking 30 yards, then turning around and walking 15 yards
2. Multiplying a number by $1\frac{2}{3}$
3. Adding 40 to a number,. Then dividing the result by one-half
4. Taking the fifth power of a positive number, then taking it positive square root.

If the volume of a cube can be found using the formula $V = e^3$, where *e* is an edge length and you knew that a cube was 250 cm^3, what would *e* be?

Finding the Inverse of a Function

A function can be considered as a set of ordered pairs in which each first element is paired ____. If you switch coordinates in the pairs, the resulting set of ordered pairs is called the ____________________________________.

Example 1: Let $f = \{(-3,-5),(-2,0),(-1,3),(0,4),(1,3),(2,0),(3,-5)\}$. Describe the inverse of *f*. Is the inverse a function?

Practice 1:

Let $h = \{(1, 1), (2, 4), (3, 9), (4, 16)\}$.

a. Describe the inverse of *h*.

b. Is the inverse a function?

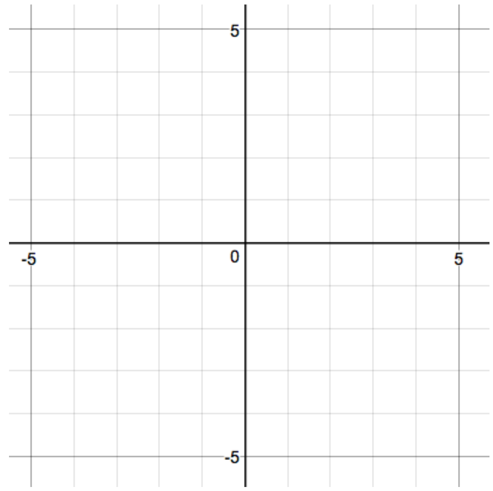
c. Describe *h* and its inverse in words.

Questions

If you are given a function, to find the inverse, all you need to do is ________________________________. If the inverse is a function, then ________________________________.

Example 2:

a. Give an equation for the inverse of the function described by $y = -x^2 + 4$.
b. Sketch a graph of $y = -x^2 + 4$ and the inverse on the same set of axes.
c. Is the inverse a function?



What do you notice about the graphs of the equations?

What do you notice about the tables at the right?

function $y = -x^2 + 4$

x	y
-2	0
-1	3
0	4
1	3
2	0
3	-5
4	-12

inverse $x = -y^2 + 4$

x	y
0	-2
3	-1
4	0
3	1
0	2
-5	3
-12	4

Practice 2:

a. Describe the graph of the function $y = 2(x+5)^2 - 1$.
b. Give an equation for the inverse of the function $y = 2(x+5)^2 - 1$.
c. Based on your answer to Part a, describe the graph of the inverse of the function. Is the inverse a function?

	Questions

Activity:

1. If $a(x)=\dfrac{1}{x-3}+4$, describe what the function does to x according to the order of operations.

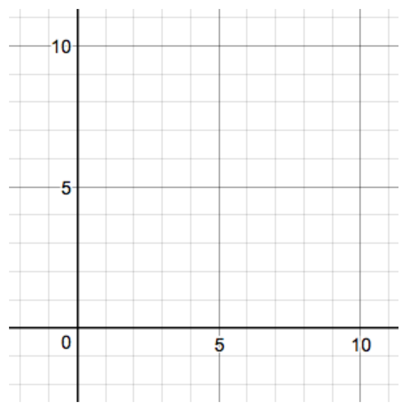
2. Describe the process to "undo" $a(x)$. Call this function b and write a formula for $b(x)$.

3. Evaluate $(a\circ b)(8)$. What do you notice?

Example 3: Consider the function *f* with $f(x)=\dfrac{1}{x-3}+4$.

a. Give an equation for the inverse of *f*.

b. Graph *f* and its inverse on the same set of axes.



Practice 3: Consider the function *f* with $h(x)=\dfrac{1}{x+8}-1$.

a. Give an equation for the inverse of *h*.

b. Is the inverse of *h* a function?

Questions

Examples 2 and 3 show us something true of about inverses: ____. When the inverse of a function is a ____________________________, then it is denoted by the symbol f^{-1} , read "*f* inverse." BEWARE: this does not mean ________________________________.

Inverse Functions and Compositions of Functions

Finding the inverse of a function requires you to switch the *x*- and *y*-coordinates. Therefore switching the domain and range of the ________________________, gives us the domain od range of the _______________________.

Inverses of Functions Theorem

Given any two functions *f* and *g*, *f* and *g* are inverse functions if and only if $f(g(x)) = x$ for all *x* in the domain of *g*, and $g(f(x)) = x$ for all *x* in the domain of *f*.

Example 4: Use the inverses of Functions Theorem to determine whether *f* and *g*, defined by $f(x)=\sqrt{2x-4}$ $g(x)=\frac{x^2+4}{2}$, are inverses. Verify by graphing.

Practice 4: : Use the inverses of Functions Theorem to determine whether $f(x)=\frac{1}{x+5}-3$ and $g(x)=\frac{1}{x-5}+3$.

Summary: