## FUNdamentals of Inverse FUNctions

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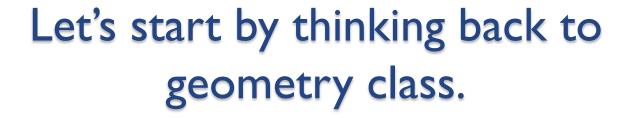
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**#NCTM** 





• We learned about reflections of a figure across a line. Let's look at what happens with a figure when we reflect it.

Geogebra reflection

 Now for comparison, let's talk about how you would do a reflection using <u>Desmos</u>



### Graph Paper

- Graph the line y = 2x + 1 marking and labeling at least 3 points on the line.
- Now reflect the three (or more) points of the graph across the line y = x and label the corresponding points.
- What do you notice? What do you wonder?



### Observations



### What happens if it's not a line?

- Create a table with about 5 points for the function  $y = x^3$  and then plot those points.
- Connect the points making a curve.
- Now find the reflection of the 5 points on the graph across the line y = x and label the corresponding points.
- Connect the new points making a new curve.
- What do you notice? What do you wonder?



### Observations



# Based on your observations, is there a relationship between each initial curve and their reflection?

$$y = 2x + 1$$

$$y = x^3$$



### Definitions of Inverses

 An inverse relation is the set of ordered pairs obtained by reversing the coordinates of each original ordered pair.

• 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).

## Why did I choose the two equations that I did?

Where does the concept of function come into the picture?

#### Inverse Functions - Definition

f and g are inverse functions, written

$$f = g^{-1}$$
 or  $g = f^{-1}$ 

if and only if  $f \circ g(x) = x$  for all x in the domain of g

and  $g \circ f(x) = x$ for all x in the domain of f.

### How can we check to see if our functions are inverses of each other?

- The concept of inverse is the idea that the 2 functions **undo each other**.
- We can use the definition of functions to check to see if two functions are inverses of each other.
- Let's investigate using Desmos.
  - Go to student.desmos.com and insert the code TQXX6











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