



FUNdamentals of Inverse FUNctions

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Let's start by thinking back to geometry class.

- 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 Desmos



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



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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



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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

$$f = g^{-1} \quad \text{or} \quad g = f^{-1}$$

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



Link to the Desmos Activity

<https://teacher.desmos.com/activitybuilder/custom/58e2807fc788ba1173e502ad>



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