

Inverses

Lesson 6

- Recall -
- If $g(x)$ is a reflection of $f(x)$ in the line $y=x$, write the equation of $g(x)$ in terms of $f(x)$.
 - What points are invariant?

Inverse of a function:

If $f(x)$ is a function with domain A and range B , the inverse function, if it exists, is denoted by $f^{-1}(x)$ and has a domain B and range A . $(x, y) \rightarrow (y, x)$

To find the inverse of a relation:

1. For an function, exchange x and y , and then solve for y .

can be written as	$f(x) = 2x + 3$
	$y = 2x + 3$
exchange x & y	$x = 2y + 3$
	$2y = x - 3$
solve for y	$y = \frac{x - 3}{2}$

Notice that the operations for the functions are opposite operations.

$f(x) = 2x + 3$, multiplies the input value by a factor of 2, and then adds 3.

The inverse function, $f^{-1}(x) = \frac{x - 3}{2}$, subtracts 3 and then divides by 2.

The opposite operations are performed in the opposite order.

Let's investigate the transformations on the basic graph of $y = x$

$$f(x) = 2x + 3$$

There is a vertical stretch by a factor of 2 and a vertical shift up 3 units

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

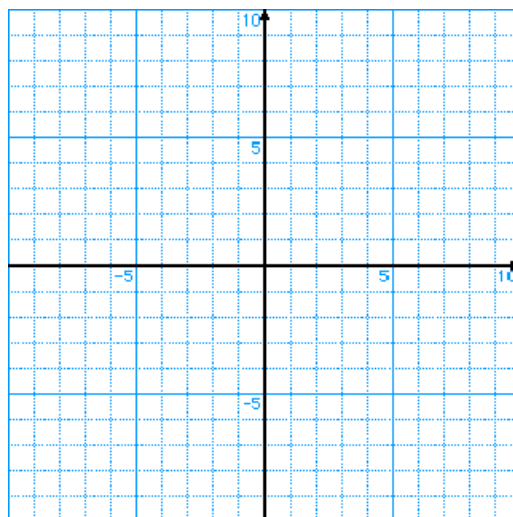
The inverse is a horizontal stretch by a factor of 2 and a horizontal shift 3 units right

Graph both of these on the same grid using a table of values.

Also, graph the line $y = x$

x	$f(x)$

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



What do you notice?

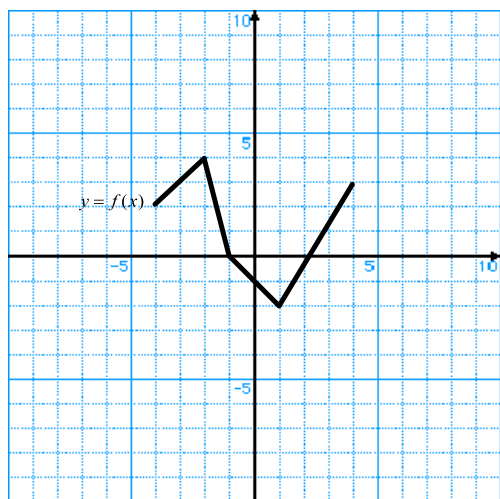
Remember: You can use inverse notation, $f^{-1}(x)$ if and only if the inverse is also a function.

Invariant points: For inverses, $y = f(x)$ and $x = f(y)$ points on the line $y = x$ are invariant since it is the line of reflection.

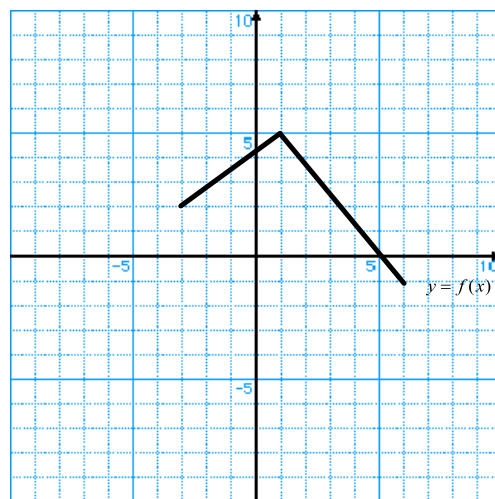
Example 2: For each graph of $y = f(x)$ shown below, draw the graph of $x = f(y)$ on the same axes. Use mapping of points

$$(x, y) \rightarrow (\quad , \quad)$$

a.

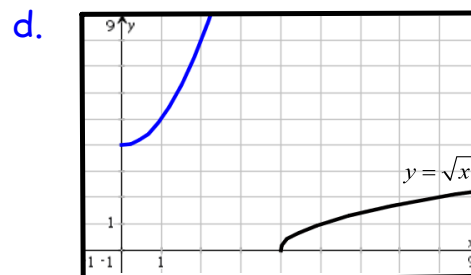
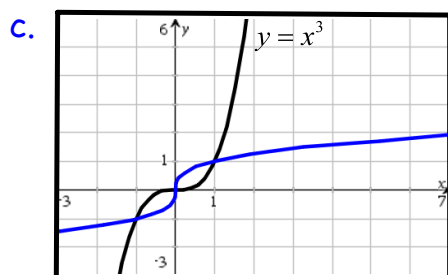
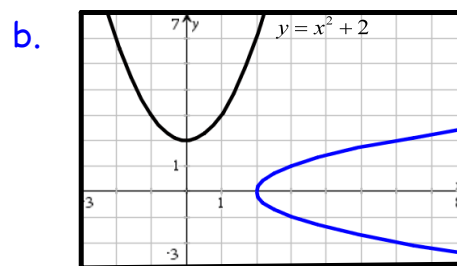
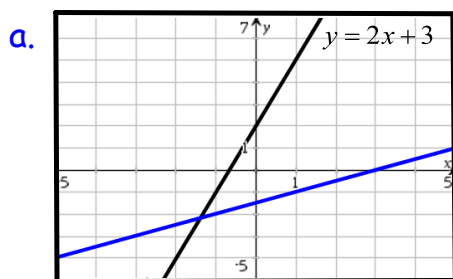


b.



Example 3:

The blue graph is a reflection of the black graph in the line $y = x$. The equation of the black graph is given. Write the equation of the blue graph.



Homework

1. Text Pages 51 - 55, Exercises # 1 - 6, 9 - 11, 13, 15
19, 20, C2.



Attachments

Reflections Assignment 1.doc

Transformations Quiz 2a.doc