Assignment

Write

Match the transformation of $f(x)$ with its effect on $f^{-1}(x)$.

1. $f(x)$ translates up D units
2. $f(x)$ translates right C units
3. $f(x)$ translates down D units
4. $f(x)$ translates left C units

a. $f^{-1}(x)$ translates up C units
b. $f^{-1}(x)$ translates left D units
c. $f^{-1}(x)$ translates right D units
d. $f^{-1}(x)$ translates down C units

Remember

The transformation function form $g(x) = Af(B(x - C)) + D$ can be applied to exponential and logarithmic functions.

A horizontal translation on a function produces a vertical translation on its inverse, while a vertical translation on a function produces a horizontal translation on its inverse. A vertical dilation on a function produces a horizontal dilation by the same factor on its inverse, while a horizontal dilation on a function produces a vertical dilation by the same factor on its inverse.

Practice

1. Given $p(x) = 5^x$ and $t(x) = p(2x) - 4$.
   a. Describe the transformation of $p(x)$ that produces $t(x)$.
   b. Write $t(x)$ as an exponential function.
2. Given $m(x) = 1.5^x$ and $k(x) = \frac{1}{3}m(-x)$.
   a. Describe the transformation of $m(x)$ that produces $k(x)$.
   b. Write $k(x)$ as an exponential function.
3. Consider the function $g(x)$, which is formed by translating the function $f(x) = \log_2 x$ left 3 units and up 4 units.
   a. Write $g(x)$ in terms of $f(x)$.
   b. Complete the table by determining the corresponding point on $g(x)$ for each reference point on $f(x)$.
   c. Graph and label $f(x)$ and $g(x)$ on the same coordinate plane.
   d. Write $g(x)$ as a logarithmic function.
   e. List the domain, range, and any asymptotes of the logarithmic function $g(x)$.

Reference Point on $f(x)$	Corresponding Point on $g(x)$
(0.5, −1)	
(1, 0)	
(2, 1)	
(4, 2)	

4. Consider $p(x) = 2^{\frac{x}{3}}$, which is a transformation of the function $f(x) = 2^x$.
   a. Describe the transformation(s) on the graph of $f(x)$ to produce $p(x)$.
   b. Write the equations of the inverse functions $f^{-1}(x)$ and $p^{-1}(x)$.
   c. Describe the transformation(s) on the graph of $f^{-1}(x)$ to produce $p^{-1}(x)$.
   d. Graph and label the inverse function $p^{-1}(x)$.

Stretch

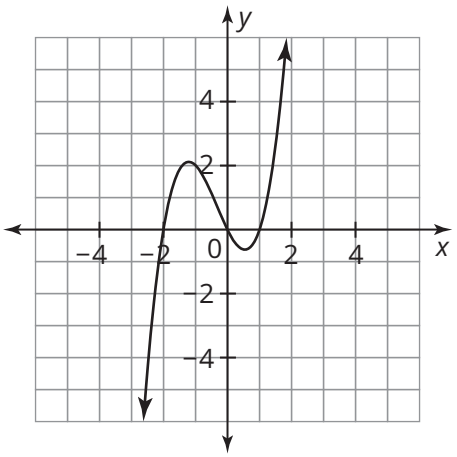
1. Consider the function $f(x) = 2^x$. The table shows the corresponding point on $g(x)$ for each reference point on $f(x)$ from the transformation of $f(x)$. Determine the function $g(x)$.

Reference Point on $f(x)$	Corresponding Point on $g(x)$
(−2, 0.25)	(−2, −2)
(−1, 0.5)	(−1, 0)
(0, 1)	(0, 1)
(1, 2)	(1, 1.5)
(2, 4)	(2, 1.75)

2. Solve for x in each equation.
   a. $25 = 5^{x+1}$
   b. $64 = 2^{3x+10}$
   c. $\frac{8}{125} = \left(\frac{2}{5}\right)^{\frac{x}{3}}$

Review

1. Consider the power function, $g(x) = x^6$.
   a. Sketch the graph of $g(x)$.
   b. Determine whether $g(x)$ invertible? Explain your reasoning.
2. Determine whether the inverse of the graphed function is a function. Explain your reasoning.



3. Consider the function $f(x) = 16x^3$.
   a. Determine the domain and range of $f(x)$.
   b. Write the inverse function $f^{-1}(x)$.
   c. Determine the domain and range of $f^{-1}(x)$.

4. Algebraically determine whether $f(x) = \frac{3}{4}x + 2$ and $g(x) = \frac{4}{3}x - \frac{1}{2}$ are inverses. Show your work.