

Assignment

Write

Given a basic function and the equation for a reflection of a basic function, explain how to determine whether the line of reflection will be the x -axis or the y -axis.

Remember

Transformations performed on any function $f(x)$ can be described by the transformation function $g(x) = Af(B(x - C)) + D$ where the D -value translates the function $f(x)$ vertically, the C -value translates $f(x)$ horizontally, the A -value vertically stretches or compresses $f(x)$, and the B -value horizontally stretches or compresses $f(x)$.

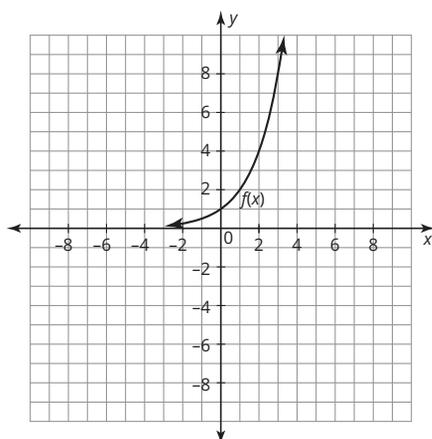
Practice

1. Complete the table to determine the corresponding points on $c(x)$, given reference points on $f(x)$. Then, graph $c(x)$ on the same coordinate plane as $f(x)$ and state the domain, range, and asymptotes of $c(x)$.

a. $f(x) = 2^x$

$c(x) = 4f(x)$

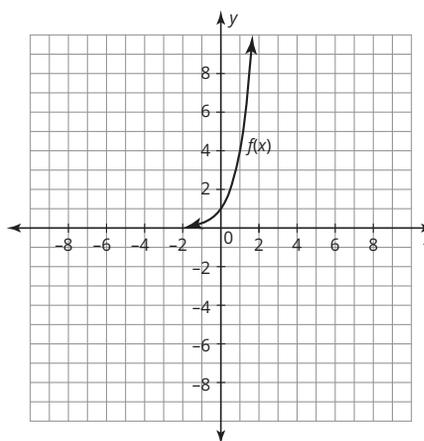
Reference Points on $f(x)$	Corresponding Points on $c(x)$
$(-1, \frac{1}{2})$	
$(0, 1)$	
$(1, 2)$	



b. $f(x) = 4^x$

$c(x) = f(-x)$

Reference Points on $f(x)$	Corresponding Points on $c(x)$
$(-1, \frac{1}{4})$	
$(0, 1)$	
$(1, 4)$	



2. Describe the transformations performed on $m(x)$ that produced $t(x)$. Then, write an exponential equation for $t(x)$.

a. $m(x) = 3^x$

$t(x) = -m(3x)$

b. $m(x) = 5^x$

$t(x) = 3m(-2x)$

c. $m(x) = 5^x$

$t(x) = m(-x)$

d. $m(x) = 7^x$

$t(x) = m(-5x) + 3$

3. Ryan bought a brand new car for \$18,000. Its value depreciated at a rate of 1.2%.
- Write a function to represent the value of the car as a function of time.
Use technology to estimate the number of years it will take for the value to reach each given amount.
 - \$17,000
 - \$15,000
 - half of the starting value
 - one-third the starting value
 - \$0
 - \$10,000
4. In 2012, the population of a city was 63,000. By 2017, the population was reduced to approximately 54,100. Identify any equations that are appropriate models for the population of the city, and explain why the others are not.
- $f(x) = 63,000(1.03)^t$
 - $f(x) = 52,477(1.03)^t$
 - $f(x) = 63,000(0.97)^t$
 - $f(x) = 52,477(0.97)^t$
 - $f(x) = 63,000(0.97)^{\frac{1}{5t}}$
 - $f(x) = 52,477(0.97)^{5t}$
5. Oscar wants to own a bee colony so that he can extract honey from the hive. He starts a colony with 5,000 bees. The number of bees grows exponentially with a growth factor of 12% each month.
- Write a function, $f(x)$, for the bee population that can be used to determine the number of bees in the colony, based on the month, x .
 - Use technology to graph the function, $f(x)$.
 - Oscar feels that in order to get a decent amount of honey, there should be at least 15,000 bees in the colony. Estimate how many months it will take Oscar until he has 15,000 bees.

Stretch

Julissa and Megan developed a new art app for smart phones. The table shows the number of customers who downloaded the app by month.

- Julissa thinks that the equation that represents the data in the table is $y = 4(2)^x$. Determine whether Julissa is correct. Explain your reasoning.
- Determine a different exponential equation that represents the data in the table. Use the equation $y = a \cdot b^{f(x)}$, where $f(x)$ is a function of x and $a = 2$.

Month	Number of Downloads
0	4
1	8
2	16
3	32
4	64
5	128

Review

1. Rewrite each expression in rational exponent form.

a. $(\sqrt[3]{6})^4$

b. $(\sqrt[8]{8})^{12}$

c. $(\sqrt[7]{x})^3$

d. $(\sqrt[10]{y})^5$

2. Eleanor receives \$1500 for her birthday. She is going to spend \$500 and wants to put the rest into an account that will earn interest. She is considering two different accounts. Account A earns 6.5% annual simple interest. Account B earns 4.5% annual compound interest.

a. Write a function for each account that can be used to determine the balance in the account based on the year, t .

b. Graph the functions for Accounts A and B using technology. Then, graph the functions. Be sure to label your graph.

c. If Eleanor plans on leaving the money in the account for 12 years, which account should she use to deposit her money? Explain your reasoning.

d. If Eleanor plans on leaving the money in the account for 25 years, which account should she use to deposit her money? Explain your reasoning.