TRANSLATIONS AND RELFECTIONS OF EXPONENTIAL FUNCTIONS

Warm Up:

Describe the transformations that have occurred to f(x) to obtain the following function:

$$y = -f(x + 3) - 7$$

If $f(x) = \frac{1}{x}$, what would be the horizontal and vertical asymptote equations for the transformed function above?

Translations and Reflections of Exponential Functions

1. Each function given below is a translation and/or reflection of the exponential function $f(x) = 3^x$. For each of these transformations, write the equation as a transformation of $f(x) = 3^x$ in function notation. Then, describe how $f(x) = 3^x$ should be shifted and/or reflected to obtain the new graph of the transformed function.

Function	$y = 3^x + 1$	$y = 3^{x-2}$	$y = 3^{x+4}$
Function Notation			
Description of Transformation			

Function	$y = -3^x$	$y = 3^{-x}$	$y = -3^{x+3} - 1$
Function Notation			
Description of Transformation			

2. Draw the graph of $f(x) = \left(\frac{1}{2}\right)^x$ and the transformation $y = -f(x+3) - 5$. What is the equation of the transformed function?
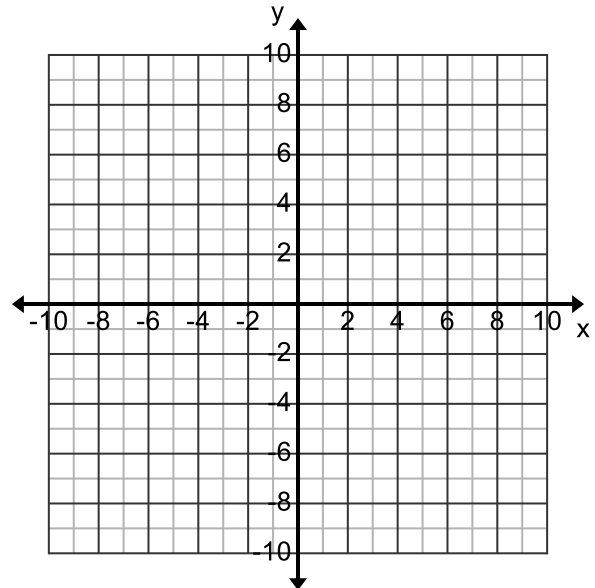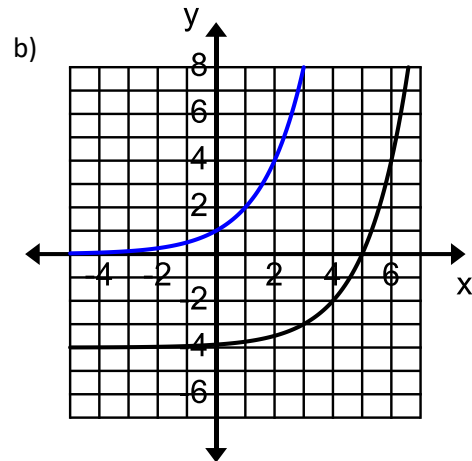
3. Given the original graph $y = 2^x$ and each of the following four transformations,

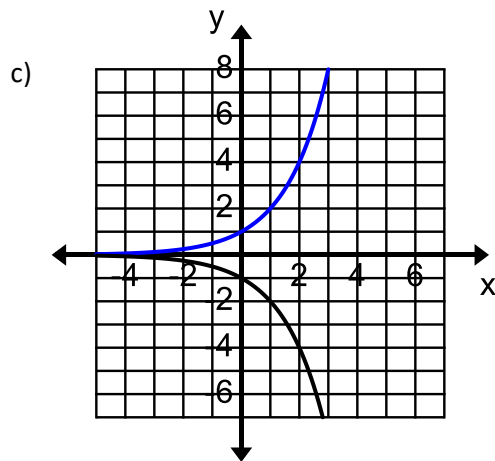   Describe each of the transformations and write the new equation.
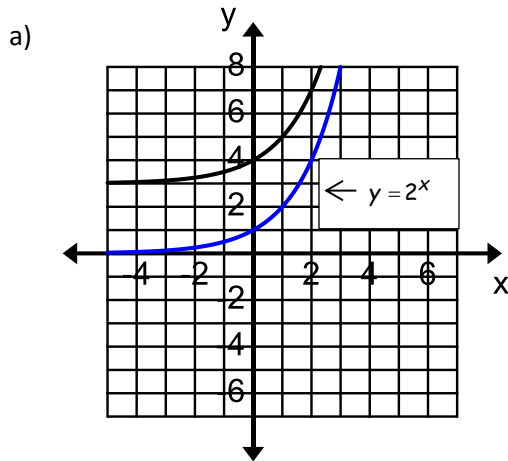
a)

$\leftarrow y = 2^x$
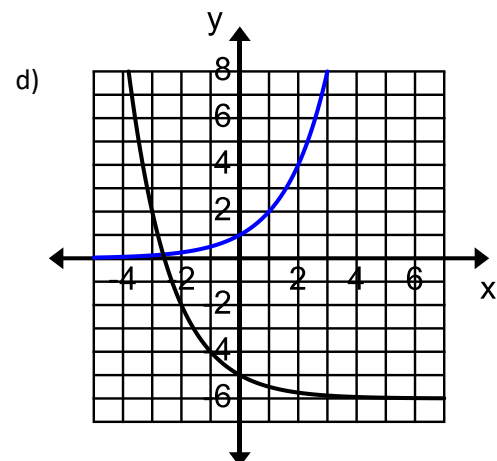
b)

Description:

New Equation:

Description:

New Equation:

c)

d)

Description:

New Equation:

Description:

New Equation:

General Equation of Exponential Functions:

$$y = ab^{k(x-d)} + c$$

$a < 0 \Rightarrow$ reflection in x-axis

$k < 0 \Rightarrow$ reflection in y-axis

$d \Rightarrow$ shift right/left ($d > 0 \Rightarrow$ right, $d < 0 \Rightarrow$ left)

$c \Rightarrow$ shift up/down ($c > 0 \Rightarrow$ up, $c < 0 \Rightarrow$ down)