

## Transformations of Exponential Functions

1. Find the equation of the horizontal asymptote for each function without using technology:

(a)  $y = 3^{-x}$       (b)  $y - 3 = 5^{\frac{x}{2}}$       (c)  $y + 7 = 2^{-x}$       (d)  $y - 6 = 4^{x+2}$

2. Without using technology, state whether these functions are growth or decay curves:

(a)  $y = 5^x$       (b)  $y = 3^{-x}$       (c)  $y = \left(\frac{1}{3}\right)^x$       (d)  $y = \left(\frac{1}{4}\right)^{-x}$

(e)  $y + 6 = 4^{\frac{x}{3}}$       (f)  $y = 6(0.8)^x$       (g)  $y - 2 = 3^{\frac{x}{7}}$       (h)  $y = 2(0.56)^{\frac{x}{4}}$

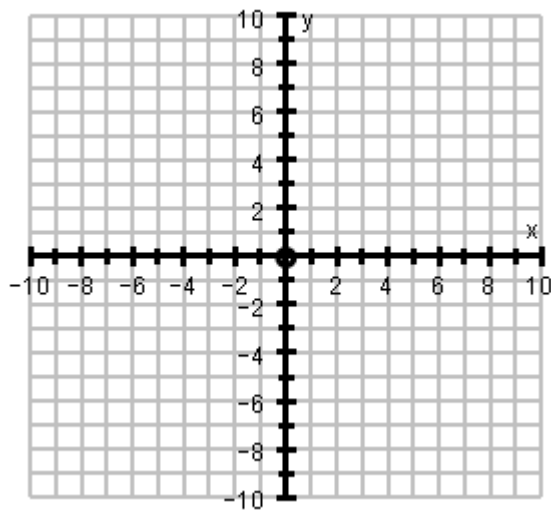
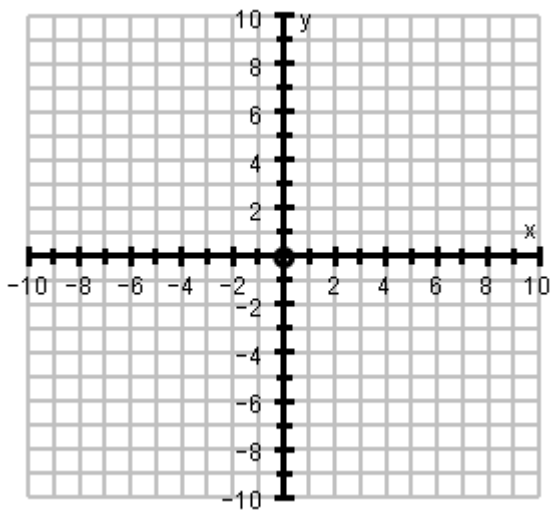
3. Change into transformational form, state the transformations, and construct the mapping rule for each function.

(a)  $y = 2(3)^x + 1$       (b)  $y = \frac{1}{2}(3)^{-x} - 5$       (c)  $y = 6(2)^{-x+3}$       (d)  $y = 2^{2x-6} + 7$

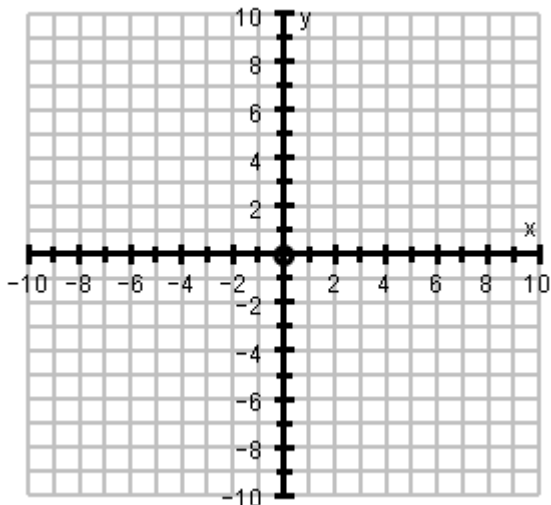
4. Graph each function using transformations and mapping rules:

(a)  $y + 4 = 3^{-x}$

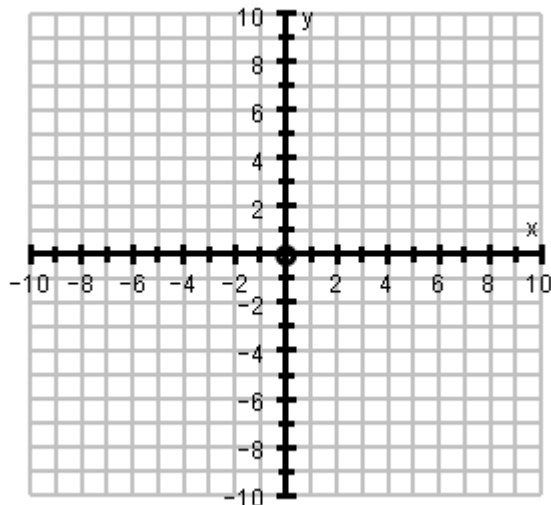
(b)  $\frac{1}{2}y = 2^{-(x+1)}$



(c)  $y = 3(2)^{-(x+4)} + 5$



(d)  $y = -4(3)^{2x-6} - 1$



5. Determine the range of each function:

(a)  $y - 1 = 2^x$

(b)  $-\frac{1}{2}y = 3^{x+7}$

(c)  $y = 2(0.6)^x + 7$

6. Find the equation of the image of  $y = 2^x$  under each mapping.

(a)  $(x, y) \rightarrow (-8x, y + 1)$

(b)  $(x, y) \rightarrow (x - 5, -3y + 2)$

(c)  $(x, y) \rightarrow \left(\frac{1}{3}x + 1, -y - 8\right)$

(d)  $(x, y) \rightarrow (-x - 9, 4y)$

7. Find the coordinates of the focal point for each exponential function without using technology.

(a)  $y = 3^x$

(b)  $y = 4(2)^x$

(c)  $y = -3^x + 6$

(d)  $y = -2(3)^{-x} - 5$

8. (a) Graph  $y = \left(\frac{1}{2}\right)^x + 2$  using a table of values. Is it a growth or decay curve?

(b) Predict what the graph of  $y = \left(\frac{1}{2}\right)^{-x} + 2$  would look

like and sketch it on the same coordinate grid. Is this new function a growth or a decay curve?

