

## Transformations of Exponential Functions

### General Equation of an Exponential Function:

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

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

$0 < |a| < 1 \Rightarrow$  Vertical Compression factor

$|a| > 1 \Rightarrow$  Vertical Stretch factor

$0 < |k| < 1 \Rightarrow$  Horizontal Stretch factor

$|k| > 1 \Rightarrow$  Horizontal Compression factor

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

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

1. Match each transformation with the corresponding equation, using  $f(x) = 10^x$  as the base. Not all transformations will match an equation.

Transformation	Equation
a) Horizontal stretch factor 3	A $y = 10^x + 3$
b) Shift 3 units up	B $y = 10^{x+3}$
c) Shift 3 units left	C $y = -10^x$
d) Vertical compression factor $\frac{1}{3}$	D $y = 10^x - 3$
e) Vertical stretch factor 3	E $y = 10^{3x}$
f) Shift 3 units right	F $y = 10^{-x}$
g) Reflect in x-axis	G $y = \left(\frac{1}{3}\right)10^x$
h) Shift 3 units down	
i) Horizontal compression factor $\frac{1}{3}$	

2. Given the function defined by the equation :  $y = 2(3)^{4(x-2)} + 7$

a) State the base/parent function.      b) Is this function increasing or decreasing?

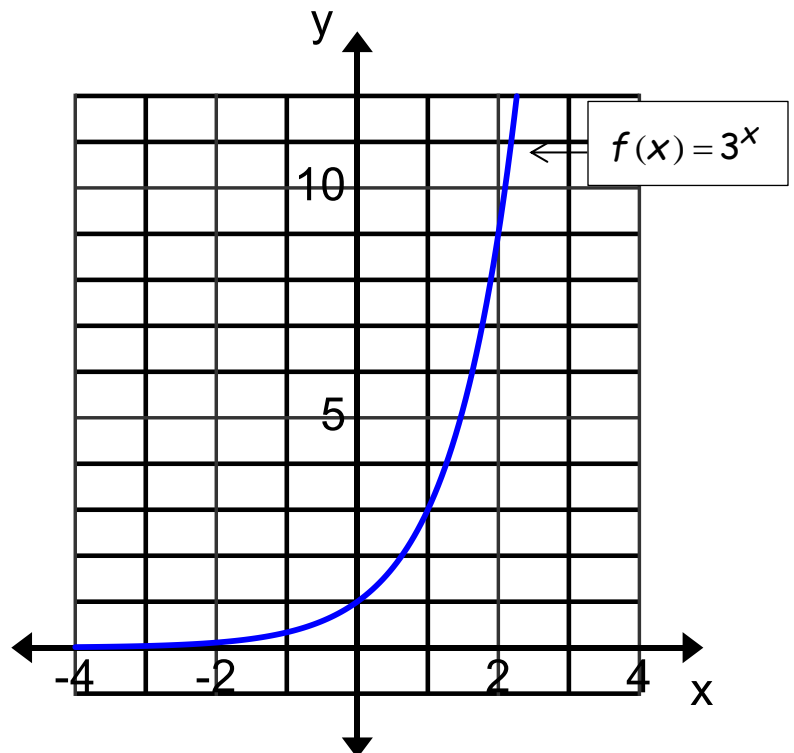
c) Describe the transformations (in order) to the exponential function compared to the parent function. Use the technical vocabulary you have learned this year.

d) State the y-intercept.

e) State the equation of the asymptote.

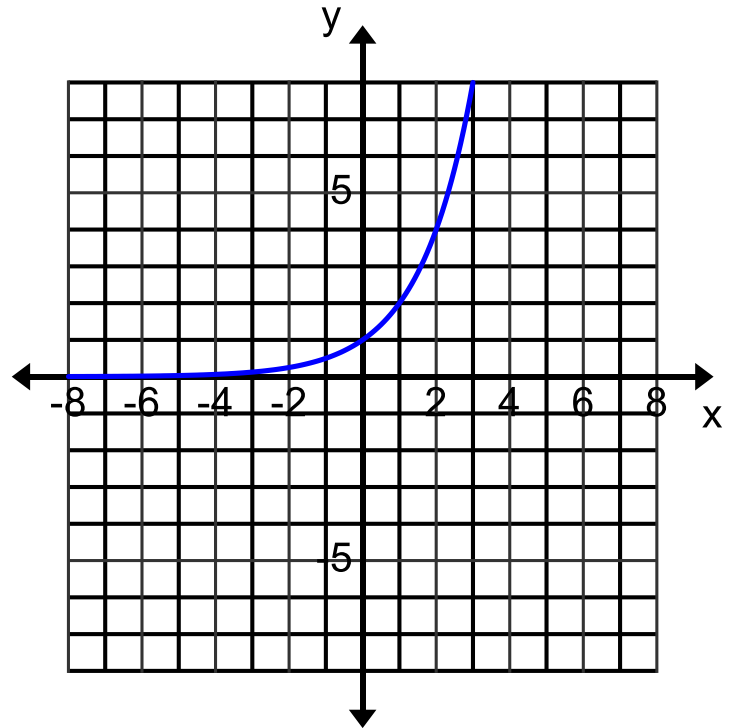
f) State the domain and range of this function.

3. Given  $f(x) = 3^x$ , graph  $y = \frac{1}{2}(3)^{\frac{1}{2}x}$  and describe the transformations.



4. a) Identify the transformations of  $f(x) = 2^x$  that will produce the graph of  $y = -f(-2x + 6) + 5$ , and determine the new equation.

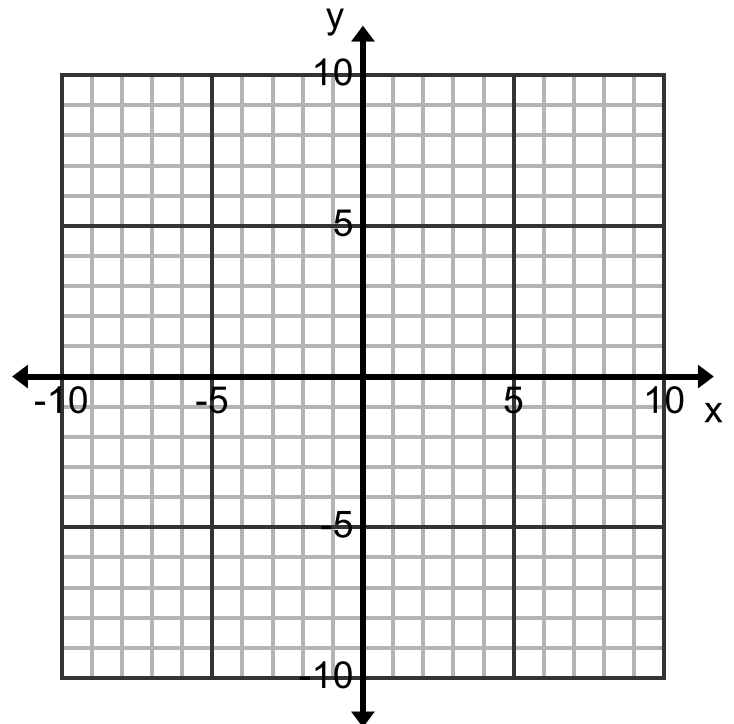
y =



- b) Graph the transformation.  
Label the final graph with its equation.

5. Apply the appropriate transformations to the exponential function to graph the following and state the domain and range.

$$y = -2 \left( \frac{1}{2} \right)^{3-x} + 6$$



D: { }

R: { }