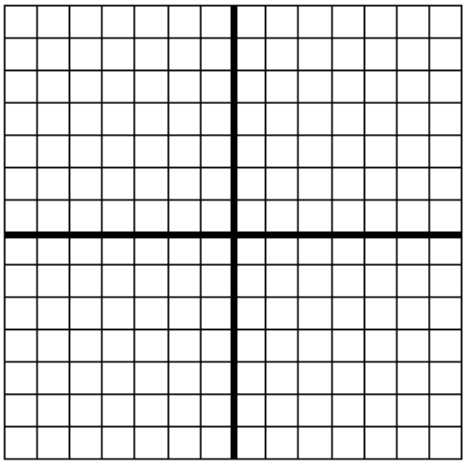
Algebra 1 Honors – Chapter 6.3 **Name:**_____

Graphing Transformations of Exponential Functions **Per** ____

Basic or ***"parent"*** Graph: $y = 2^x$

Graph by a table of values:

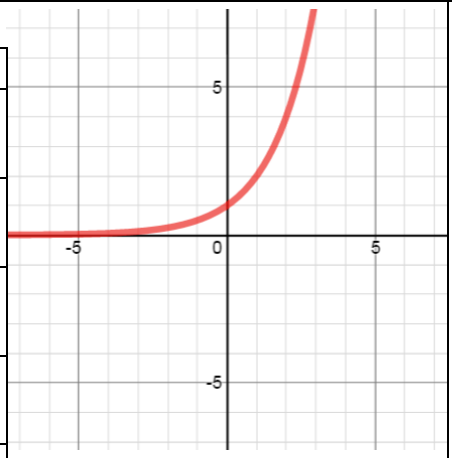
x	$y = 2^x$
-2	
-1	
0	
1	
2	



Important characteristics:

A. $y = 2^x + 3$

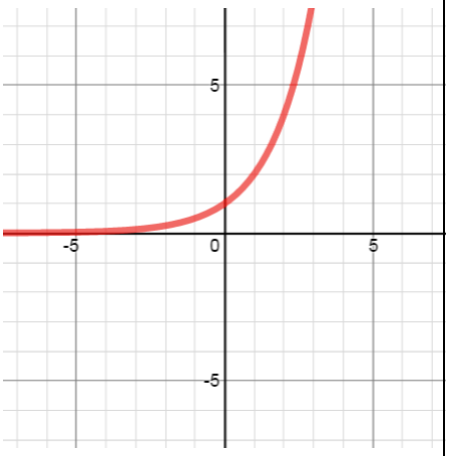
x	$y = 2^x + 3$
-2	
-1	
0	
1	
2	



Contrast to Parent Function:

B. $y = 2^x - 3$

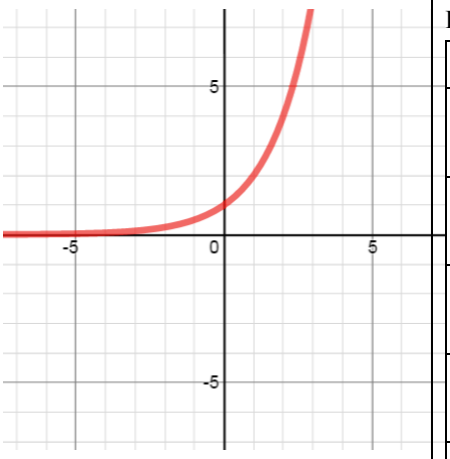
x	$y = 2^x - 3$
-2	
-1	
0	
1	
2	



Contrast to Parent Function:

C. $y = 2^{x+3}$

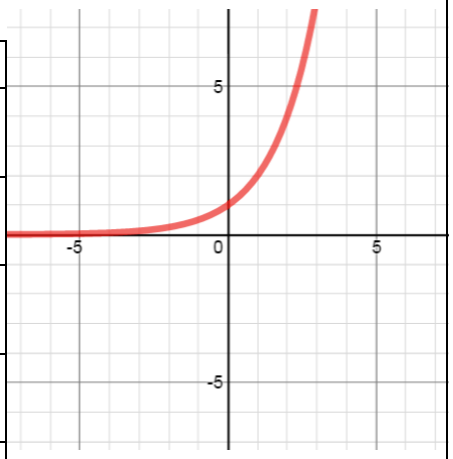
x	$y = 2^{x+3}$
-5	
-4	
-3	
-2	
-1	



Contrast to Parent Function:

D. $y = 2^{x-3}$

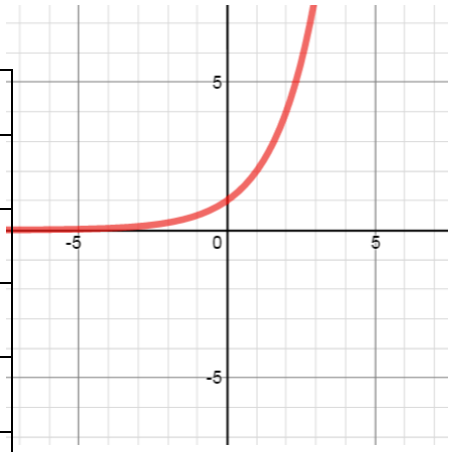
x	$y = 2^{x-3}$
1	
2	
3	
4	
5	



Contrast to Parent Function:

E. $y = \left(\frac{1}{2}\right)^x$

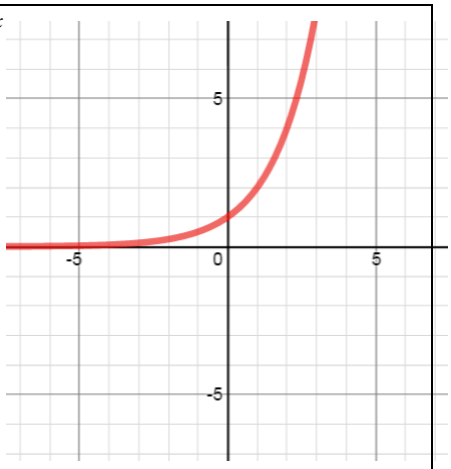
x	$y = \left(\frac{1}{2}\right)^x$
-2	
-1	
0	
1	
2	



Contrast to Parent Function:

***CHALLENGE** $y = -2^x$

x	$y = -2^x$
-2	
-1	
0	
1	
2	



Contrast to Parent Function:

GRAPHING EXPONENTIAL FUNCTIONS $f(x) = b^x$

When $b > 1$ When $0 < b < 1$

TRANSFORMING EXPONENTIAL FUNCTIONS

Exponential functions, as well as linear, quadratic, and polynomial functions, **can all undergo the same types of transformations.**

Type of Transformation	***Example*** *Parent function:* $f(x) = 2^x$	***General Condition*** **Parent function: *f*(*x*)**
Vertical translation ***(up or down)***	$g(x) = 2^x + \mathbf{3}$ (3 units up) $h(x) = 2^x - \mathbf{1}$ (1 unit down)	$f(x) + \boldsymbol{k}$ $k > 0$ up $k < 0$ down
Horizontal translation ***(to the left or right)***	$g(x) = 2^{(x-\mathbf{4})}$ (4 units right) $t(x) = 2^{(x+\mathbf{3})}$ (3 units left)	***f*(*x* –*h*)** $h > 0$ right $h < 0$ left [*h* is positive if it's right after the minus sign.]
Vertical stretch or compression	$g(x) = \mathbf{3}\,(2)^x$ (stretch) $h(x) = \frac{1}{3}(2)^x$ (compression)	***a f*(*x*)** $a > 1$ stretch compression $0 < a < 1$
Reflection	$g(x) = -2^x$	***–f*(*x*)** over *x*-axis opposite of

Use the chart to answer the questions below.

1. How does the graph of $f(x) = 2.7^x$ compare to the graph of $g(x) = 2.7^x - 4$?

   _____

2. How does the graph of $f(x) = 2.7^x$ compare to the graph of $g(x) = 2.7^{(x-5)}$?

   _____