

## Key Features of Exponential Functions

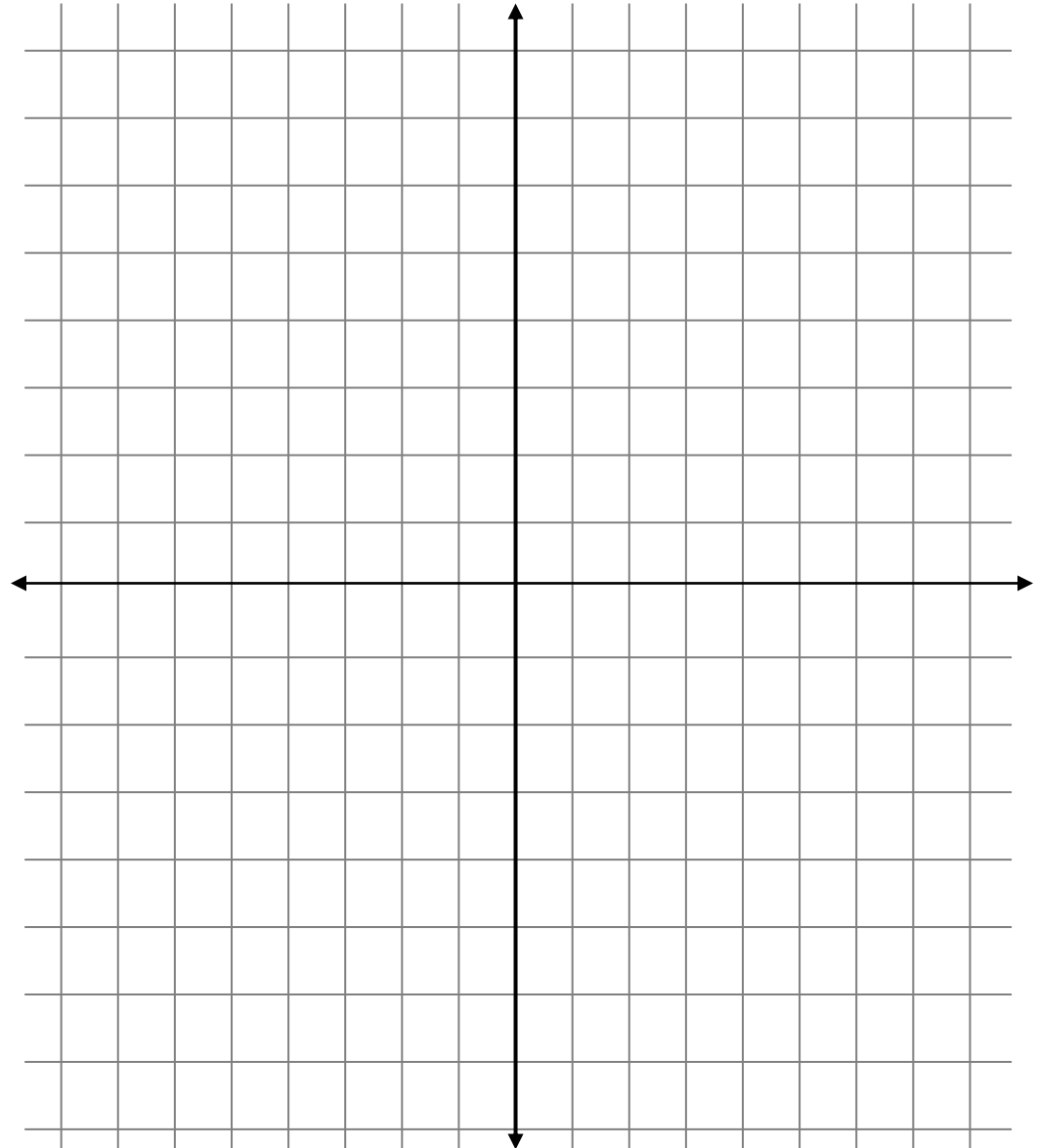
Term	Definition
<b>Exponential Function</b>	
<b>How Does Changing a Affect the Graph?</b>	
<b>Exponential Growth</b>	
<b>Exponential Decay</b>	

**Examples:** Give the key features of the following exponential functions.

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

x	y
3	
2	
1	
0	
-1	
-2	
-3	

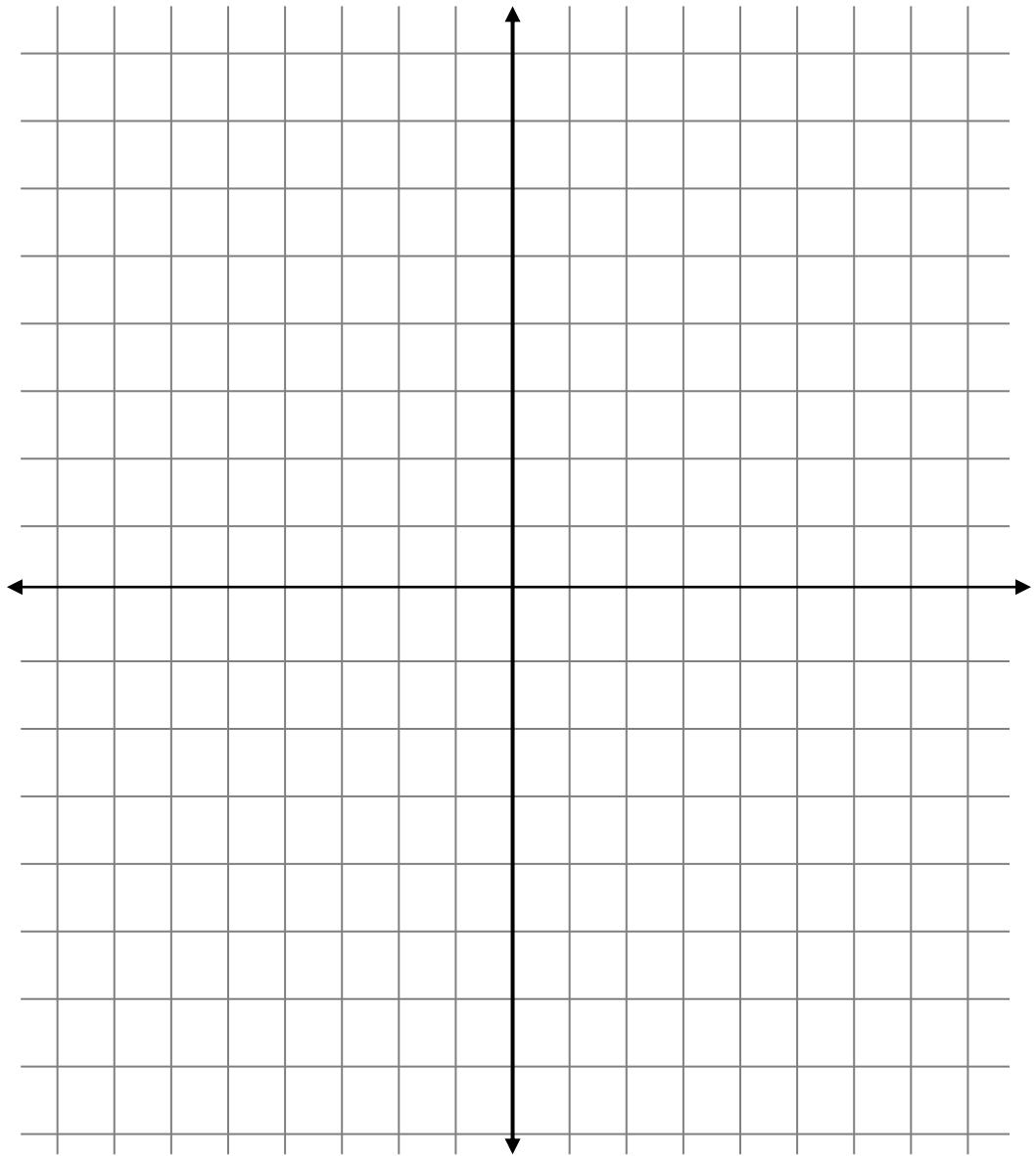
<b>Domain</b>	
<b>Range</b>	
<b>y-intercept</b>	
<b>Asymptote</b>	
<b>End Behavior</b>	
<b>Growth or Decay?</b>	



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

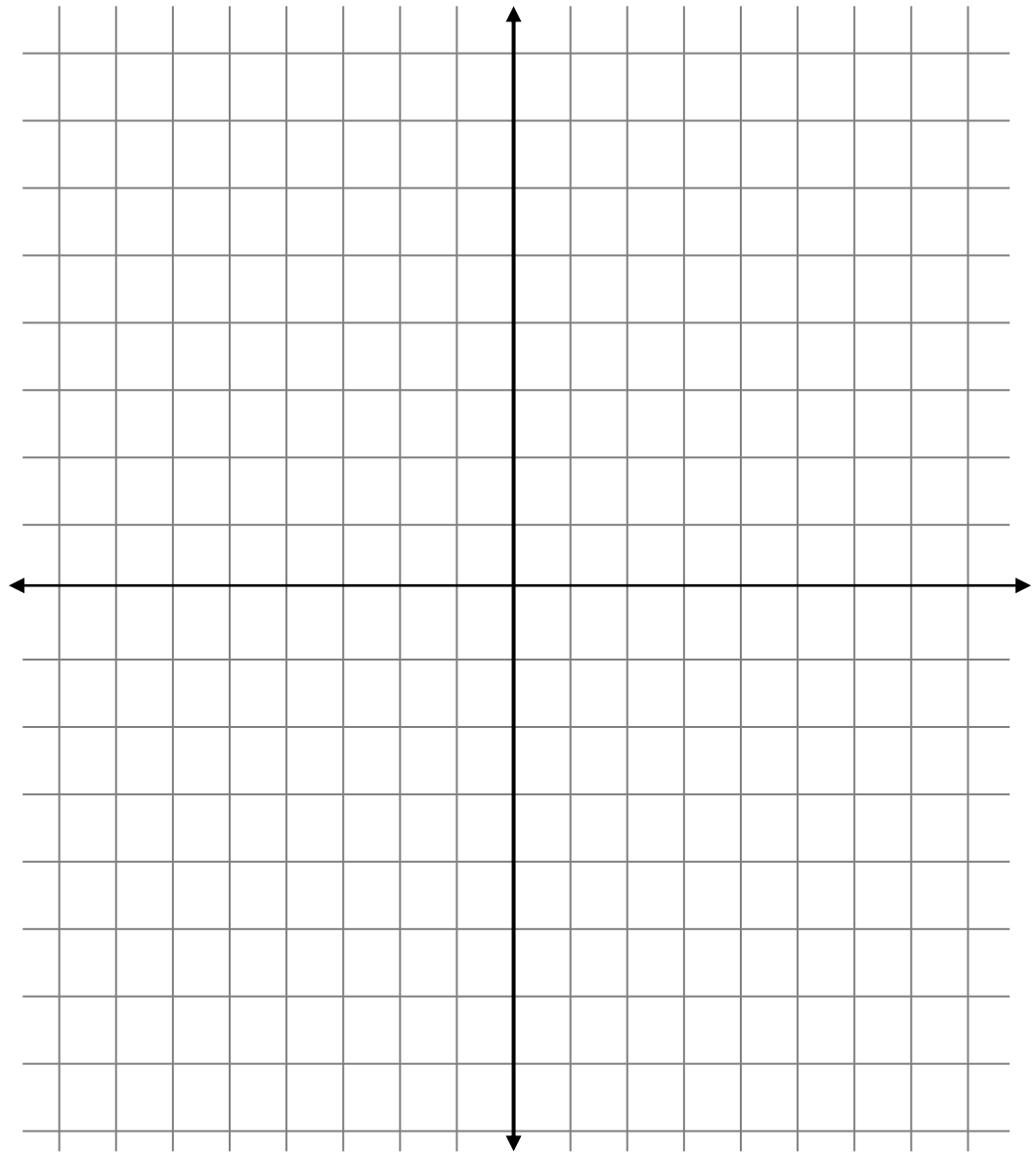
x	y
3	
2	
1	
0	
-1	
-2	

Domain	
Range	
y-intercept	
Asymptote	
End Behavior	
Growth or Decay?	



3. Sketch  $f(x) = 4(0.5)^x$

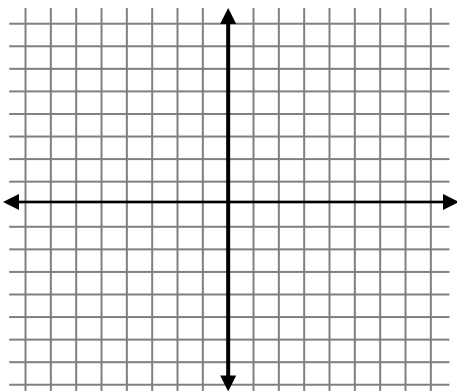
<b>Domain</b>	
<b>Range</b>	
<b>y-intercept</b>	
<b>Asymptote</b>	
<b>End Behavior</b>	
<b>Growth or Decay?</b>	



Examples: Sketch Transformations of Exponential Functions

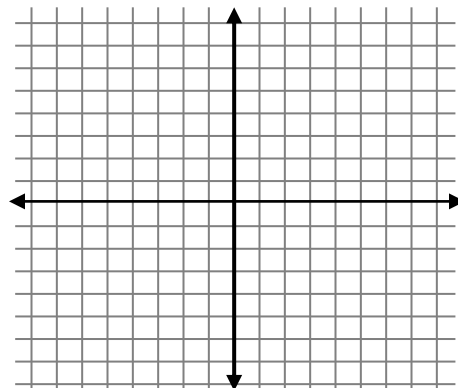
4. Parent Function:  $f(x) = 3^x$

Transformation:  $g(x) = -3^x$



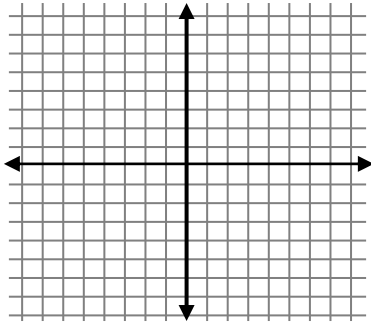
5. Parent Function:  $f(x) = 3^x$

Transformation:  $g(x) = 3^{x-2} + 4$

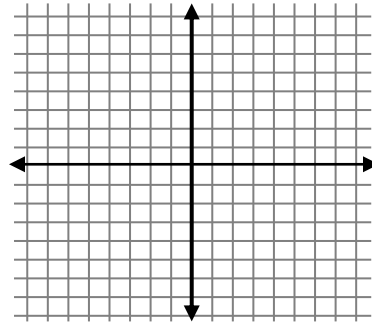


6. Sketch the transformation of the function  $f(x) = 5^x$  ?

a)  $g(x) = 5^{x+3}$



b)  $h(x) = 5^{x-1} + 3$



**Exponential Model for Growth and Decay**

Examples: Applications of Exponential Functions

7. The population of a large city was about 3 million in the year 2010 and grew at a rate of 5% for the next four years.

a) What exponential function models the population of the city over that 4-year period?

b) If the population continues to grow at the same rate, what will the population be in 2040?

8. The population of a large city was about 4.6 million in the year 2010 and grew at a rate of 1.3% for the next four years.

a) What exponential function models the population of the city over that 4-year period?

b) If the population continues to grow at the same rate, what will the population be in 2040?

9. A factory purchased a 3D printer in 2010. The value of the printer is modeled by the function  $f(x) = 30(0.93)^x$ , Where  $x$  is the number of years since 2010.

a. What is the value of the printer after 10 years?

b. Does the printer lose more of its value in the first 10 years or in the second 10 years after it was purchased?