

SM3-A Lesson 1-7
Exponential Function
 $f(x) = 2^x$

Fill in the table. Graph the points.

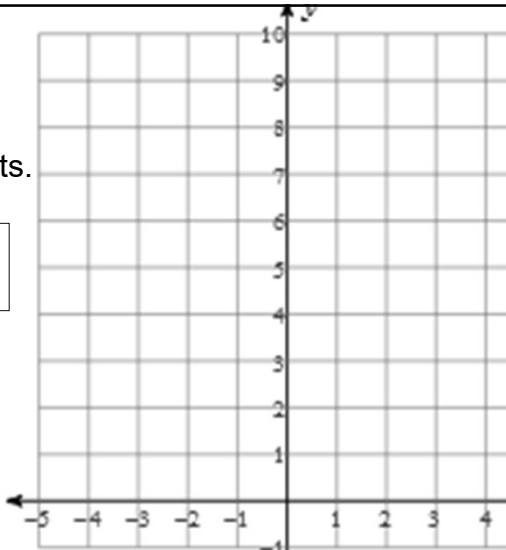
_____ is the base of the exponential

x	$2^{(\)}$	y
-2	2^{-2}	0.25
-1		
0		
1		
2		

* _____

* _____

* _____



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

$2^0 = 1$

_____ property

_____ property

Exponential Function $f(x) = 2^x$

Will the 'y' value ever reach zero (on the left end of the graph)?

x	$2^{(\)}$	y
-1	$2^{(-1)}$	$1/2$
-2		
-3		
-4		
-5		

$f(-1) = 1/2$

As the denominator gets _____, the decimal version of the fraction gets _____.

'y' gets closer and closer to zero but never reaches zero.

Horizontal Asymptote: a horizontal line (or y-value) the graph _____ but never _____.

$y = \underline{\hspace{2cm}}$

Domain = ?

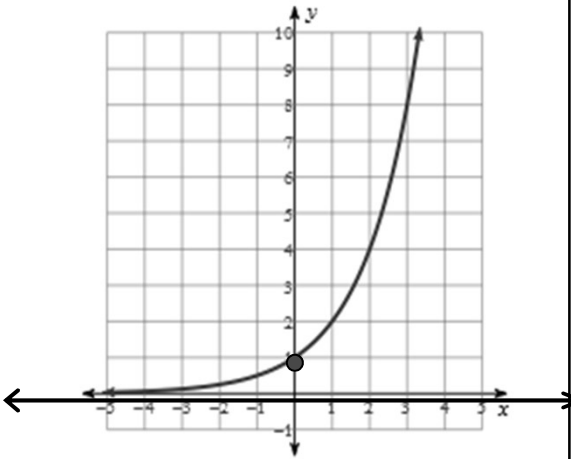
$x = \underline{\hspace{2cm}}$

range = ?

$y = \underline{\hspace{2cm}}$

y-intercept = ?

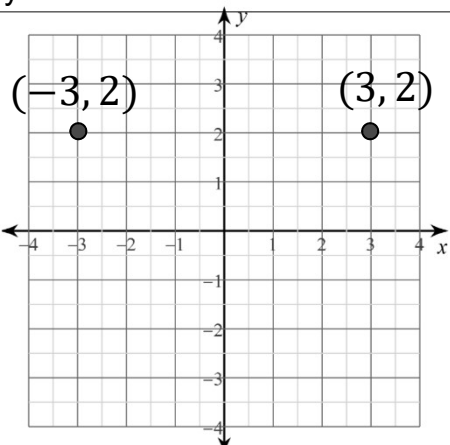
$f(\underline{\hspace{1cm}}) = \underline{\hspace{1cm}}$

$f(x) = 2^x$


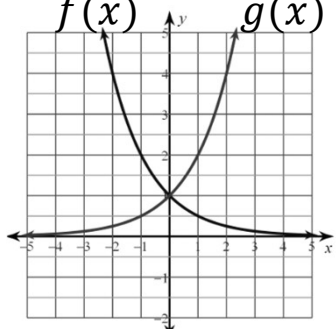
$g(x) = 2^x$ $f(x) = \left(\frac{1}{2}\right)^x$

Reflection across the y-axis

→ Replacing '____' with '(____)' causes a reflection across the y-axis



$f(x)$ $g(x)$



$f(x) = 2^{-x}$

$f(x) = (2^{-1})^x$

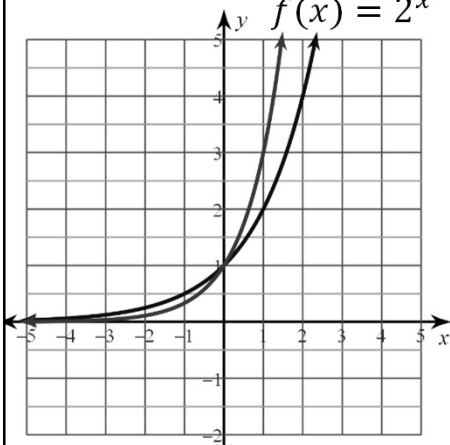
Property of Exponents

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

_____ Exponent Property

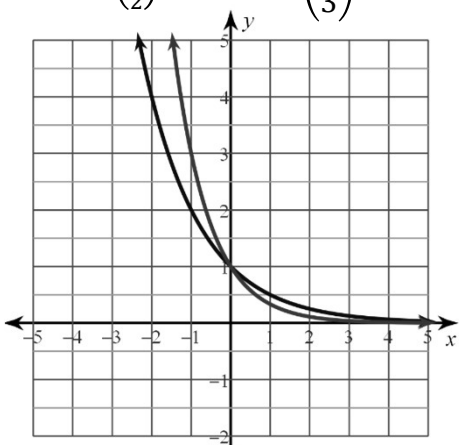
Exponential Decay: the graph is _____ (as you go from left to right the graph goes downward). This occurs when the base of the exponential is between _____ and _____.

$g(x) = 3^x$
 $f(x) = 2^x$

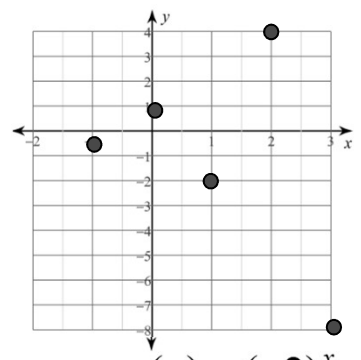
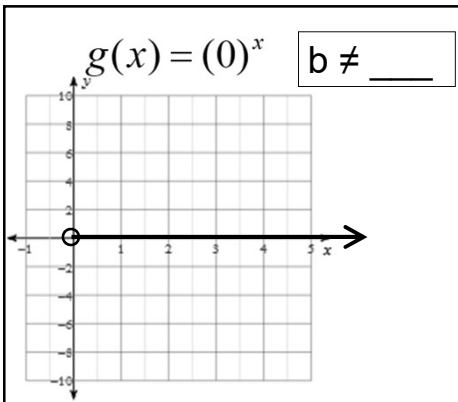


'b' > 1 → _____

$k(x) = (\frac{1}{2})^x$ $g(x) = (\frac{1}{3})^x$

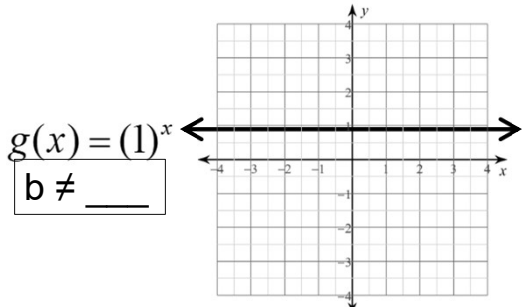


0 < 'b' < 1 → _____



$g(x) = (-2)^x$

b ≠ _____



VSF=3

$f(x) = 2^x$ $g(x) = 3(2)^x$

x	2^x	f(x)	g(x)
-2	2^{-2}	0.25	
-1	2^{-1}	0.5	
0	2^0	1	
1	2^1	2	
2	2^2	4	

Horizontal asymptote: $y = \underline{\hspace{2cm}}$

Domain = ? range = ? y-intercept = ? $f(x): (0, \underline{\hspace{1cm}})$

$x = (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$ $y = (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$ $g(x): (0, \underline{\hspace{1cm}})$

UP 4

$f(x) = 2^x$ $k(x) = 2^x + 4$

x	2^x	f(x)	k(x)
-2	2^{-2}	0.25	
-1	2^{-1}	0.5	
0	2^0	1	
1	2^1	2	
2	2^2	4	

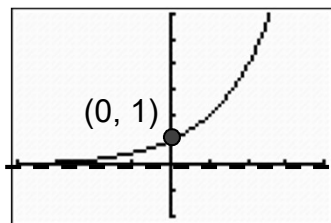
Horizontal asymptote: $f(x): y = \underline{\hspace{2cm}}$

$g(x): y = \underline{\hspace{2cm}}$ range = ? y-intercept = ? $f(x): (0, \underline{\hspace{1cm}})$

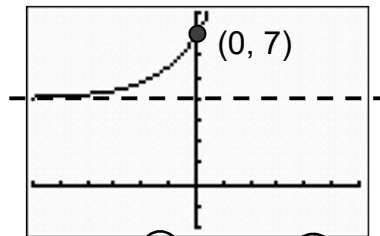
Domain = ? $f(x): y = (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$ $f(x): (0, \underline{\hspace{1cm}})$

$x = (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$ $g(x): y = (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$ $g(x): (0, \underline{\hspace{1cm}})$

Transformations of the Exponential Function



$f(x) = 2^x$
Base-2 Exponential
Parent Function



$h(x) = \textcircled{3}(2)^x + \textcircled{4}$
VSF= 3 Up 4 shift

$$y = ab^x + k$$

VSF: \rightarrow a \leftarrow vertical shift and horizontal Asymptote
 y-intercept: $(0, a + k)$ \leftarrow Growth Factor (the base of the exponential)
 $h(0) = 3(2)^0 + 4$
 $h(0) = 7$