

Fill in the table for the function  $f(x) = 2^x$ .

$8^0 = 1$   
 $2^3 8^0 = 1$   
 $(312)^0 = 1$

x	0	1	2	3	4	5	6	7
f(x)	1	2	4	8	16	32	64	128

$2^0 \quad 2^1 \quad 2^2 \quad 2^3 \quad 2^4 \quad 2^5 \quad 2^6 \quad 2^7$

Explain how to get the previous number in the table, for example from  $f(7)$  to  $f(6)$ ?

$2^4 = 16$        $2^2 = 4$   
 $2^{-4} = \frac{1}{16}$        $2^{-2} = \frac{1}{4}$   
 multiply by 2

Use the pattern to fill in the table for the negative exponents.

$\div 2 \Rightarrow \cdot \frac{1}{2}$        $\div 7 \Rightarrow \cdot \frac{1}{7}$

x	-4	-3	-2	-1	0	1	2	3
f(x)	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

$\frac{1}{8} \cdot \frac{1}{2} \quad \frac{1}{4} \cdot \frac{1}{2} \quad \frac{1}{2} \cdot \frac{1}{2} \quad \frac{1}{1} \cdot \frac{1}{2} \quad \frac{1}{2} \cdot \frac{1}{2} \quad \frac{1}{4} \cdot \frac{1}{2} \quad \frac{1}{8} \cdot \frac{1}{2}$

Review: Negative Exponents – Evaluate

a)  $f(x) = 3^x$ , given  $x = -1$

$3^{-1} = \frac{1}{3}$

b)  $g(x) = 4^x$ , given  $x = -2$

$4^{-2} = \frac{1}{16}$

c)  $f(t) = 2^t$ , given  $t = -5$

$2^{-5} = \frac{1}{32}$

d)  $h(x) = 5^x$ , given  $x = -1$

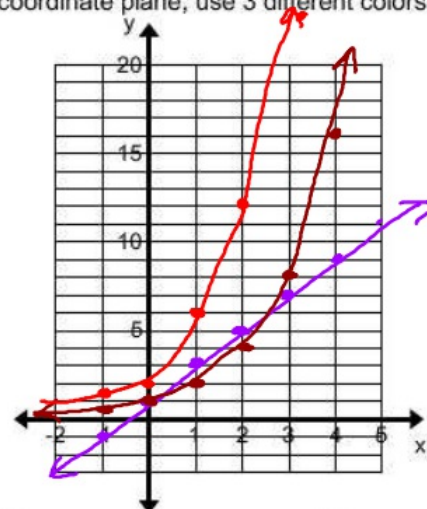
$5^{-1} = \frac{1}{5}$

Standard Form of an Exponential Growth Function:  $f(x) = a \cdot b^{x-h} + k$

$h$ :  $-h$  move left  $+h$  move right       $k$ :  $-k$  down  $+k$  up

The Effect of a: Graph the following functions on the same coordinate plane, use 3 different colors. Then state the domain and range.

$f(x) = 2x + 1$		$f(x) = 2^x$		$f(x) = 3 \cdot 2^x$	
x	f(x)	x	f(x)	x	f(x)
-1	$2(-1)+1 = -1$	-1	$2^{-1} = \frac{1}{2}$	-1	$3 \cdot \frac{1}{2} = \frac{3}{2}$
0	$2(0)+1 = 1$	0	$2^0 = 1$	0	$3 \cdot 1 = 3$
1	$2(1)+1 = 3$	1	$2^1 = 2$	1	$3 \cdot 2 = 6$
2	$2(2)+1 = 5$	2	$2^2 = 4$	2	$3 \cdot 4 = 12$



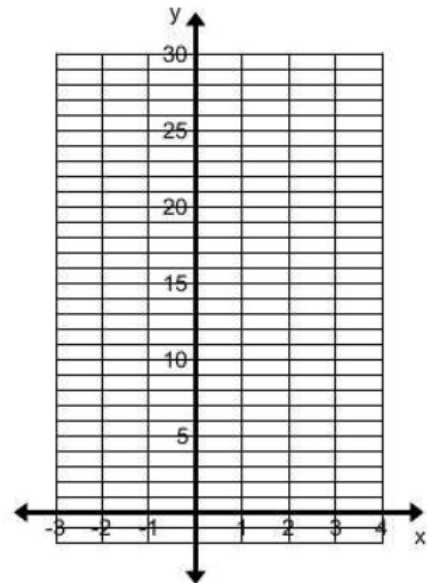
- How does  $a$  (the starting point) affect the graph?

D:

R:

**The Effect of  $b$ :** Graph the following functions on the same coordinate plane, use 3 different colors. Then state the domain and range.

$f(x) = 2^x$		$f(x) = 3^x$		$f(x) = 5^x$	
$x$	$f(x)$	$x$	$f(x)$	$x$	$f(x)$
-1		-1		-1	
0		0		0	
1		1		1	
2		2		2	
3		3		3	



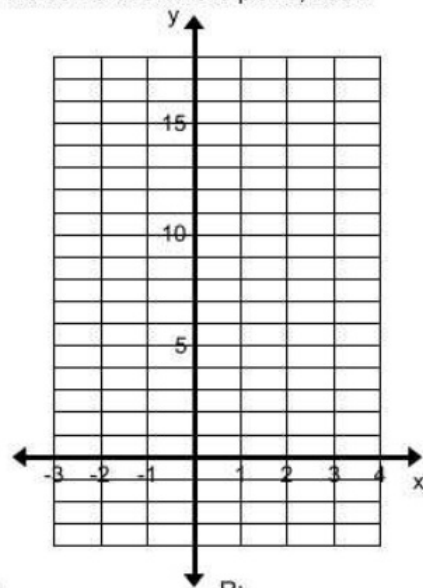
- How does  $b$  (the multiplier) affect the graph?

D:

R:

**The Effect of  $k$  (asymptote):** Graph the following functions on the same coordinate plane, use 3 different colors.

$f(x) = 4^x$		$f(x) = 4^x + 2$		$f(x) = 4^x - 1$	
$x$	$f(x)$	$x$	$f(x)$	$x$	$f(x)$
-1		-1		-1	
0		0		0	
1		1		1	
2		2		2	



- How does  $k$  (the shift) affect the graph?

D:

R:

Describe the transformations used to obtain the graph of  $g(x)$  from the graph of  $f(x)$ .

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

$$g(x) = 3 \cdot 2^x - 1$$

Show your work!

Evaluate.

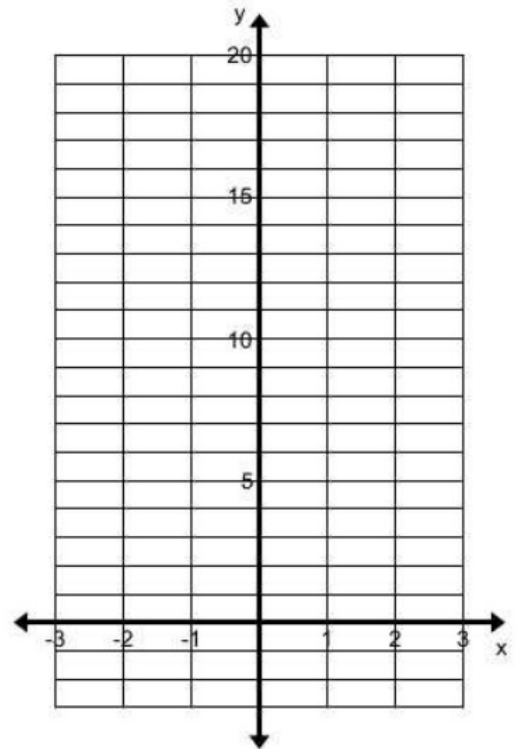
1.  $f(x) = 4^x$ , given  $x = -3$       2.  $g(x) = 2^x$ , given  $x = -4$     3.  $h(x) = 5^x$ , given  $x = -2$
4.  $g(x) = 2^x$ , given  $x = -1$       5.  $f(t) = 2^t$ , given  $t = -5$       6.  $h(t) = 5^t$ , given  $t = -4$
7. Graph the following functions on the same coordinate plane, use 4 different colors. State the domain and range for each function.

$f(x) = 3x + 2$	
$x$	$f(x)$
-1	
0	
1	
2	
D:	R:

$f(x) = 2 \cdot 3^x$	
$x$	$f(x)$
-1	
0	
1	
2	
D:	R:

$f(x) = 3^x + 2$	
$x$	$f(x)$
-1	
0	
1	
2	
D:	R:

$f(x) = 2 \cdot 3^x + 2$	
$x$	$f(x)$
-1	
0	
1	
2	
D:	R:



8. Describe the transformations used to obtain the graph of  $g(x)$  from the graph of  $f(x) = 4^x$ . State the domain and range for each transformation.

a)  $g(x) = -2 \cdot 4^x$  D: R:

b)  $g(x) = 4^x + 2$  D: R:

c)  $g(x) = 3 \cdot 4^x - 8$  D: R:

9. Evaluate.

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

$$g(x) = 4x$$

$$h(x) = 5^x$$

a)  $-2[f(3)]$

b)  $g(x) - 3$

c)  $h(2) + 4$

d)  $g\left(\frac{1}{2}\right) + 10$

e)  $f(-5)$

f)  $3[h(4)]$

10. Write the equation of the following function and answer the question.

You are planning on saving money for college. You currently have a total of \$1,500 saved up. You plan on investing \$500 in your 529 College saving plan that make an 8% return on your investment. How much money will you have saved up after 4 years? How much money will you have after 4 years if you invest the entire \$1,500?

a) only invest \$500 for 4 years?

b) invest entire \$1,500 for 4 years?