

stretch or shrink  
 (# > 1)                      (# < 1)

### Graphing Exponential Functions NOTES

Exponential Function:

$$y = a(b)^{x-h} + k$$

Transformations:

Reflect

move left or right (+) (-)  
 move up or down (+) (-) [Asymptote]

Asymptote:

a line that a curve approaches but will NEVER TOUCH or CROSS.

Describe the transformation:

1.  $f(x) = \left(\frac{4}{3}\right)^x + 2$

• up 2

2.  $f(x) = 2^x - 5$

• down 5

3.  $f(x) = \left(\frac{5}{3}\right)^{x+1}$

• left 1

4.  $f(x) = 5^{x-3}$

• Right 3

5.  $f(x) = -2^x$

• Reflect

6.  $f(x) = 3(2)^{x+3} + 2$

• left 3  
 • up 2

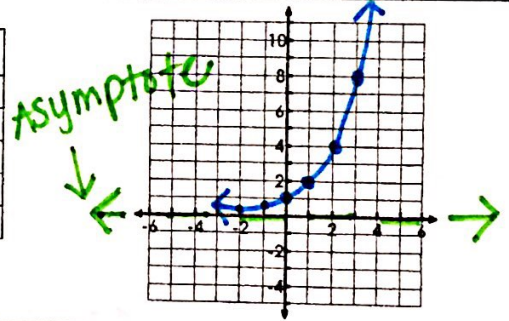
• stretch by 3

7.  $y = 2^x$  +0 ← Asymptote

Asymptote:  $y = 0$

Growth or Decay

x	y
-2	.25
-1	.5
0	1
1	2
2	4
3	8

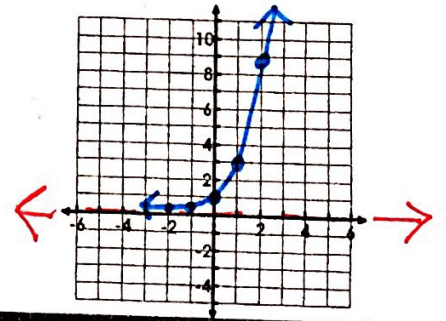


8.  $y = 3^x$   

Asymptote:  $y = 0$

Growth or Decay

x	y
-2	.11
-1	.33
0	1
1	3
2	9

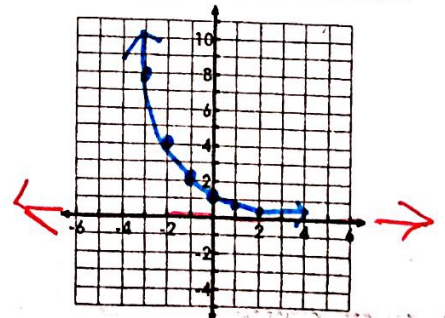


9.  $y = \left(\frac{1}{2}\right)^x$   

Asymptote:  $y = 0$

Growth or Decay

x	y
-2	4
-1	2
0	1
1	.5
2	.25



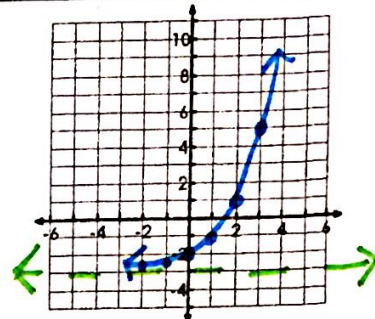
What part of the equations makes an exponential function increase or decrease?  
 when base ( $y = a \underline{b}^x$ ) is a  $\# > 1$  the function is a **Growth**  
 is a  $\# < 1$  the function is a **DECAY**

10.  $y = 2^x - 3$

Asymptote:  $y = -3$

**Growth** or Decay

x	y
-2	-2.75
-1	-2.5
0	-2
1	-1
2	1
3	5

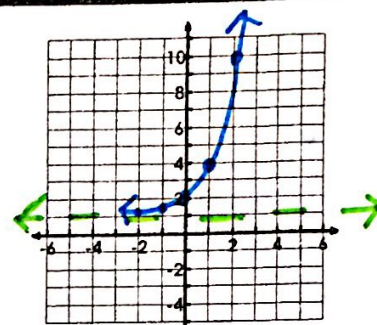


11.  $y = 3^x + 1$

Asymptote:  $y = 1$

**Growth** or Decay

x	y
-2	1.11
-1	1.33
0	2
1	4
2	10

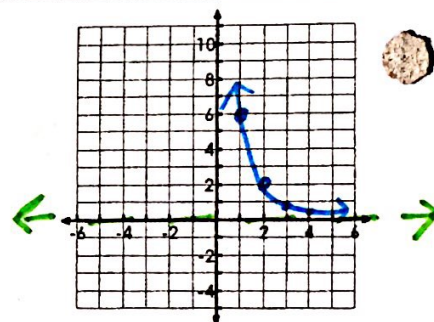


12.  $y = 2 \left(\frac{1}{3}\right)^{x-2}$

Asymptote:  $y = 0$

Growth or **Decay**

x	y
-2	1/2
-1	3/4
0	1/8
1	1/6
2	1/2
3	.67
4	.22



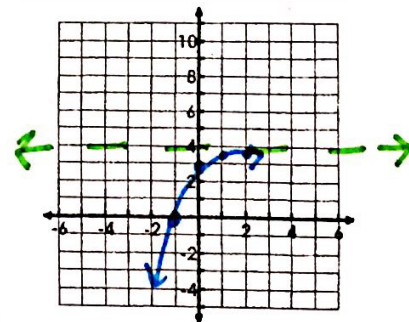
13.  $y = -\left(\frac{1}{4}\right)^x + 4$

Asymptote:  $y = 4$

Growth or **Decay**

**Reflected DECAY**

x	y
-2	-12
-1	0
0	3
1	3.75
2	3.94



14.  $y = -3(2)^x - 4$

Asymptote:  $y = -4$

**Growth** or Decay

**Reflected Growth**

x	y
-2	-4.75
-1	-5.5
0	-7
1	-10
2	-16

