

# 5.1 Day 1

Friday, February 23, 2018 12:31 PM

## 5.1 – Graphing Exponential Functions

I. Graph these two functions on the same graph:

**A**  
 $y=2^x$

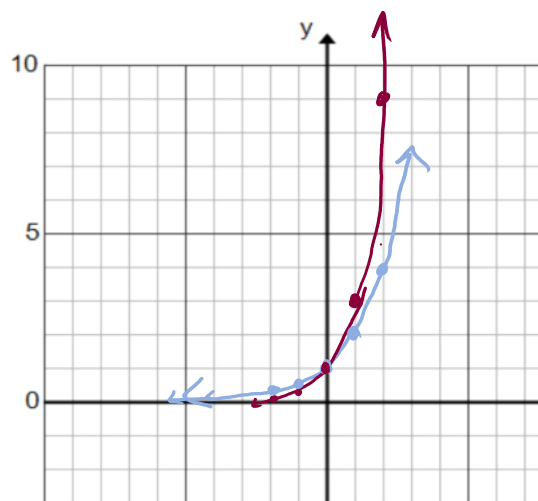
**B**  
 $y=3^x$

$A > B$   
 $(-\infty, 0)$

$A < B$   
 $(0, \infty)$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4

x	y
-2	1/9
-1	1/3
0	1
1	3
2	9



Does this represent exponential growth or decay? Explain why.

Growth  $x \uparrow y \uparrow$

II. Graph these two functions on the same graph:

**A**  
 $y = \left(\frac{1}{2}\right)^x$

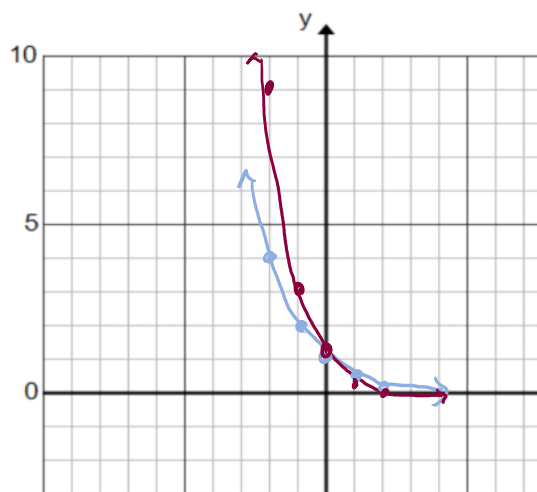
**B**  
 $y = \left(\frac{1}{3}\right)^x$

$A > B$   
 $(0, \infty)$

$A < B$   
 $(-\infty, 0)$

x	y
-2	4
-1	2
0	1
1	1/2
2	1/4

x	y
-2	9
-1	3
0	1
1	1/3
2	1/9



Does this represent exponential growth or decay? Explain why.

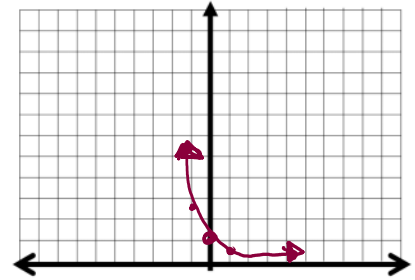
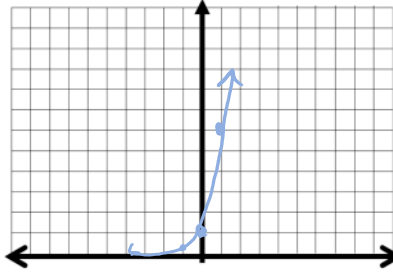
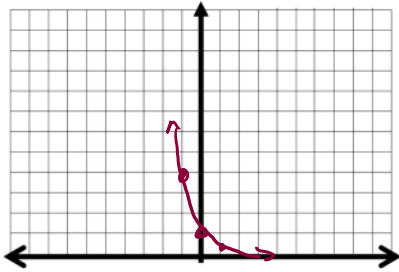
Decay  $x \uparrow y \downarrow$

III. Predict if each function represents growth or decay, then use the table feature on your calculator to quickly graph the following exponential functions:

a.  $y = \left(\frac{1}{4}\right)^x$  Decay

b.  $y = 6^x$  Growth

c.  $y = .4^x$  Decay



**Quick Summary for:  $y = b^x$**

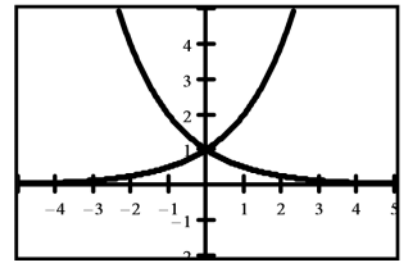
If  $b > 1$ , the function represents: Growth

If  $0 < b < 1$ , the function represents: Decay

y-intercept: (0, 1)

x-intercept: NONE

Asymptotes?  $y = 0$



\*\*\* See page 329 Theorem 1 for full list of properties!

IV. Describe the transformations on  $g(x)$  from the parent function  $f(x) = 2^x$

a.  $g(x) = 2^x + 4$

$\frac{\vee}{\uparrow 4}$

b.  $g(x) = 2^{3x} - 1$

$\frac{\vee}{\downarrow 1}$   $\frac{\#}{\text{shrink BAFO } 1/3}$

c.  $g(x) = 4 \cdot 2^{-x}$

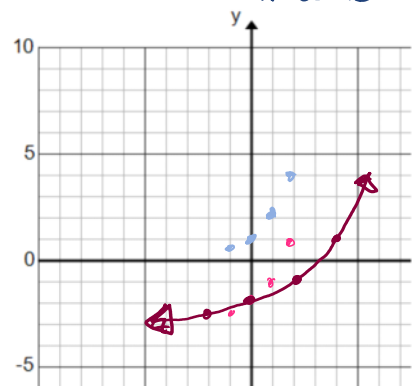
$\frac{\vee}{\text{stretch BAFO } 4}$   $\frac{\#}{\text{reflect over y-axis}}$

d.  $g(x) = -\frac{1}{2} \cdot 2^{4x}$

$\frac{\vee}{\text{1. shrink BAFO } 1/2}$   $\frac{\#}{\text{2. reflect over x-axis}}$   $\frac{\#}{\text{shrink BAFO } 1/4}$

Graph  $f(x) = 2^x$  and the transformed graph:  $g(x) = 2^{\frac{1}{2}x} - 3$

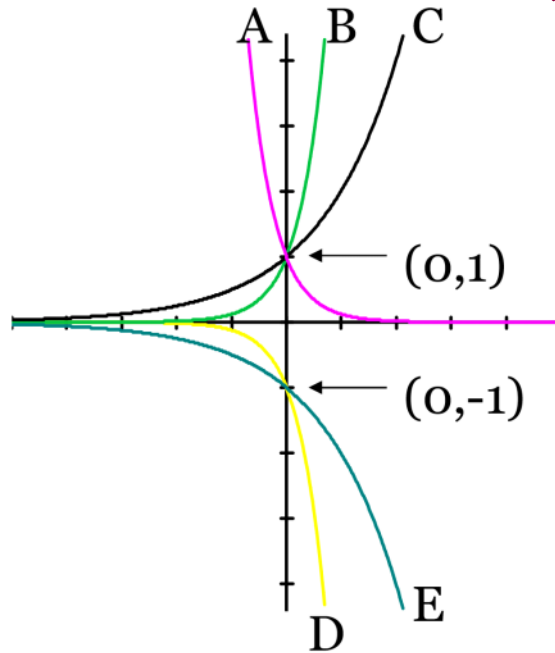
x	y
-2	$2^{-2} - 3 = -\frac{5}{2}$
0	$2^0 - 3 = -2$
2	$2^2 - 3 = 1$
4	$2^4 - 3 = 13$



# Match the graph with letter of the equation below

math is fun!

- 1)  $y = -8^x$       D
- 2)  $y = 8^x$       B
- 3)  $y = -2^x$       E
- 4)  $y = 2^x$       C
- 5)  $y = 8^{-x}$       A



## Solving exponential equations

2 steps:

- 1) like bases
- 2) set the exponents = & solve

1.  $3^{4x+5} = 81$        $x = -1/4$   
 $3^{4x+5} = 3^4$   
 $4x+5 = 4$   
 $4x = -1$
2.  $4^{8x-3} = \frac{1}{16}$        $x = 1/8$   
 $4^{8x-3} = 4^{-2}$   
 $8x-3 = -2$   
 $8x = 1$
3.  $2^{x^2} = 16$   
 $2^{x^2} = 2^4$   
 $x^2 = 4$        $x = \pm 2$
4.  $5^{4y} = 25^{2y}$   
 $5^{4y} = 5^{2y}$   
 $4y = 2y$   
 $2y = 0$   
 $y = 0$
5.  $6^{2-3x} = 216^{x+5}$   
 $6^{2-3x} = (6^3)^{x+5}$   
 $6^{2-3x} = 6^{3(x+5)}$   
 $2-3x = 3x+15$   
 $-6x = 13$   
 $x = -13/6$
6.  $2^{x^2+15} = 4^{x^2+x}$   
 $2^{x^2+15} = 2^{2(x^2+x)}$   
 $x^2+15 = 2(x^2+x)$   
 $x^2+15 = 2x^2+2x$   
 $x^2+2x-15 = 0$   
 $(x+5)(x-3) = 0$   
 $x = -5$        $x = 3$