

Good morning!

1. "Here"
2. Notes on Graphing Exponential Functions and their characteristics
3. Homework is on DeltaMath:)
4. Quiz opens tomorrow!

Algebra 1
Unit 3
 Exponential Functions

Monday	Tuesday	Wednesday	Thursday	Friday
			March 25 th	March 26 th
			Transformations of Exponential Functions	
March 29 th	March 30 th	March 31 st	April 1 st	April 2 nd
Graphing and Characteristics of Exponential Functions	Practice; Quiz Opens	Quiz Due at Midnight	Exponential Word Problems	Geometric Sequences
April 5 th	April 6 th	April 7 th	April 8 th	April 9 th
Spring Break				
April 12 th	April 13 th	April 14 th	April 15 th	April 16 th
Review	Review	Test in Class		

$$E+P. \quad y = a \cdot (b)^{c(x-h)} + k \quad \Bigg| \quad \text{Quadrant } y = a(x-h)^2 + k$$
Transformations of Exponential Functions - Matching

___ 1) Reflection over x-axis, translation left 2

a) $y = -\frac{1}{2}(4)^{x+2}$

___ 2) Vertical stretch of 2, translation down 3

b) $y = 2 \cdot 4^{x+3}$

___ 3) Reflection over x-axis, vertical stretch of 3, translation down 2

c) $y = -3 \cdot 4^x - 2$

___ 4) Vertical shrink of $\frac{1}{2}$, translation left 2, reflection over x-axis

d) $y = -3 \cdot 4^{x+2}$

___ 5) Reflection over x-axis, translation right 2, vertical stretch of 3

e) $y = -4^{x+2}$

___ 6) Reflection over x-axis, translation up 2

f) $y = -\frac{1}{2}(4)^x + 2$

___ 7) Vertical stretch of 2, translation left 3

g) $y = 2 \cdot 4^x - 3$

___ 8) Vertical stretch of 2, translation right 3

h) $y = 2 \cdot 4^{x-3}$

___ 9) Vertical shrink of $\frac{1}{2}$, translation down 2, reflection over x-axis

i) $y = -3 \cdot 4^{x-2}$

___ 10) Vertical stretch of 2, translation up 3

j) $y = -4^x + 2$

___ 11) Vertical shrink of $\frac{1}{2}$, translation up 2, reflection over x-axis

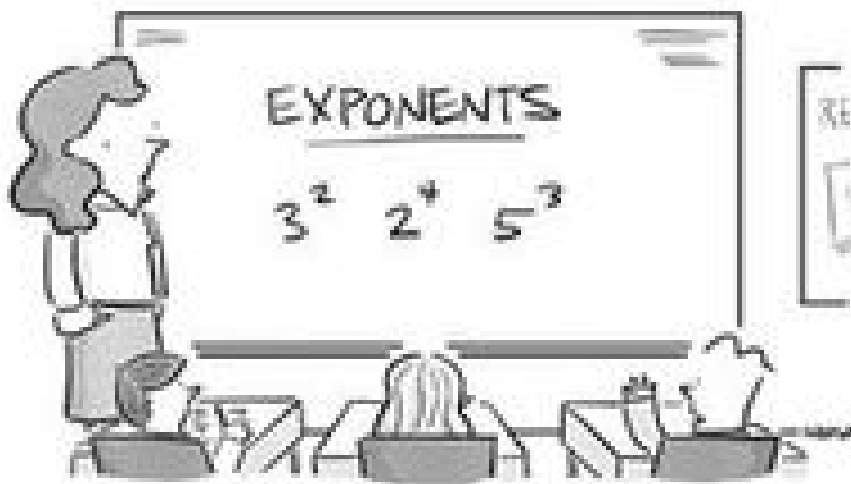
k) $y = 2 \cdot 4^x + 3$

___ 12) Reflection over x-axis, translation left 2, vertical stretch of 3

l) $y = -\frac{1}{2}(4)^x - 2$

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"Why did they quit being ponents?"

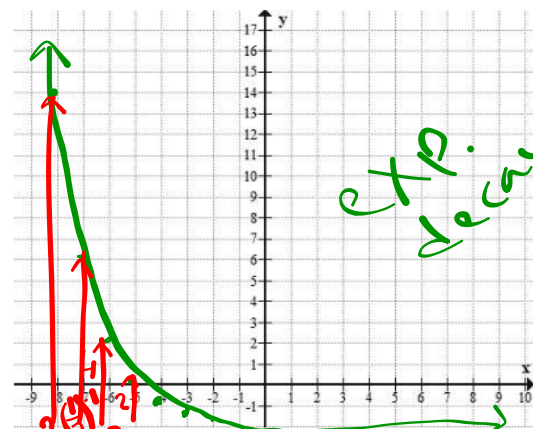
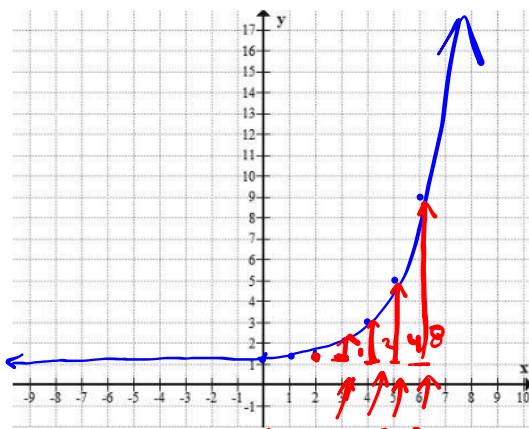
Graphing Exponential Functions

To graph exponential functions, begin by identifying the value of h. This will go in the middle of the x-values on your table (you want three spaces on each side of h). Fill in the other x-values of your table by adding/subtracting 1. Then, use your calculator to find the y-values. Then graph.

1) $y = 2^{x-3} + 1$ $y = 2$ Parent 2) $y = 2\left(\frac{1}{2}\right)^{x+5} - 2$

x	0	1	2	3	4	5	6
y	1.125	1.25	1.5	2	3	5	9

x	-8	-7	-6	-5	-4	-3	-2
y	14	6	2	0	-1	-1.5	-1.75

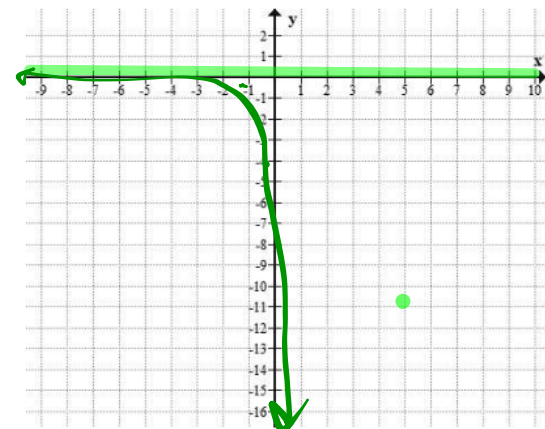
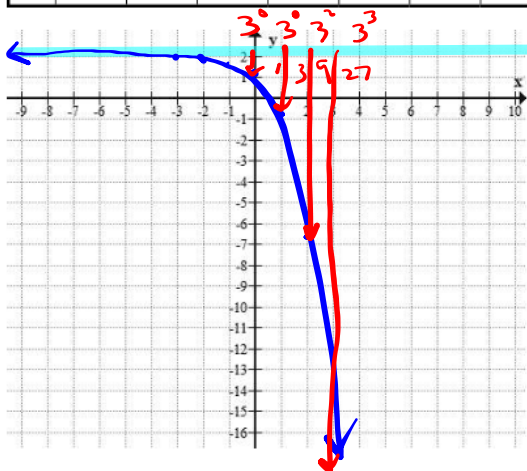


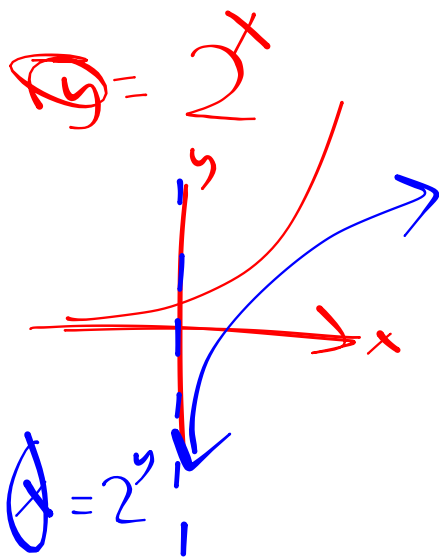
$a = -1$ $b = 3$ $h = 0$ $k = 2$
 3) $y = -3^x + 2$

$a = -3/4$ $b = 6$ $h = -1$ $k = 0$
 4) $y = -\frac{3}{4}(6)^{x+1}$

x	-3	-2	-1	0	1	2	3
y	1.9	1.8	1.6	1	-1	-7	-25

x	-4	-3	-2	-1	0	1	2
y	.007	.02	.1	.75	4.5	27	162

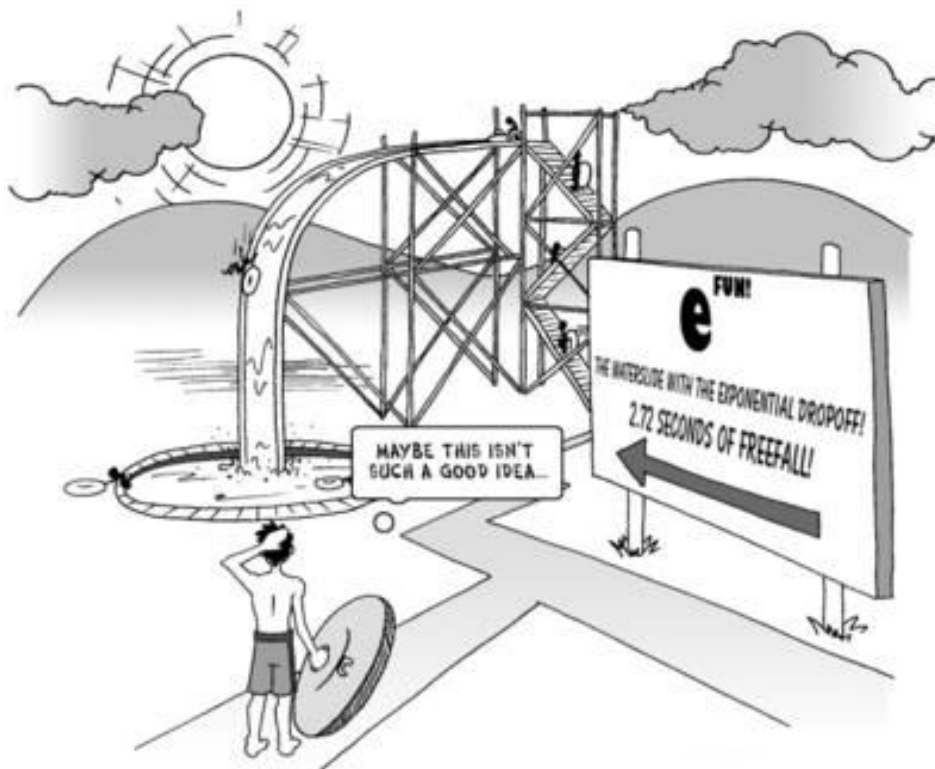




$$\begin{aligned}
 2^8 &= 256 \\
 2^7 &= 128 \\
 2^6 &= 64 \\
 2^5 &= 32 \\
 2^4 &= 16 \\
 2^3 &= 8 \\
 2^2 &= 4 \\
 2^1 &= 2 \\
 2^0 &= 1
 \end{aligned}$$

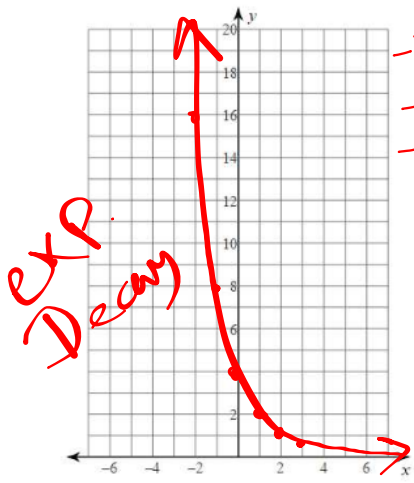
$$\begin{aligned}
 2^{-1} &= \frac{1}{2} = .5 \\
 2^{-2} &= \frac{1}{4} = .25 \\
 2^{-3} &= .125 \\
 2^{-4} &= \frac{1}{16} = .0625 \\
 2^{-5} &= \frac{1}{32} \\
 &\vdots \\
 2^{-\infty} &= 0
 \end{aligned}$$

Horizontal Asymptote



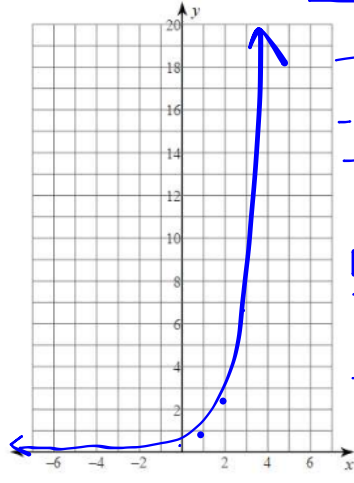
Graphing Exponentials Practice

1) $y = 4\left(\frac{1}{2}\right)^x$



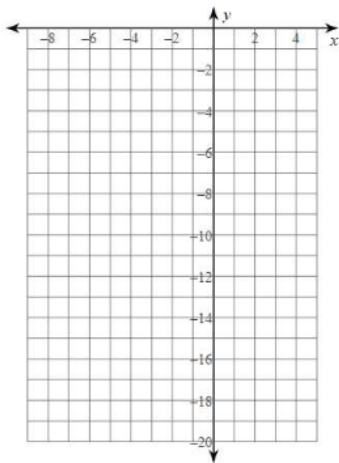
x	y
-3	32
-2	16
-1	8
0	4 a
1	2
2	1
3	1/2 = .5

2) $y = \frac{1}{4} \cdot 3^x$

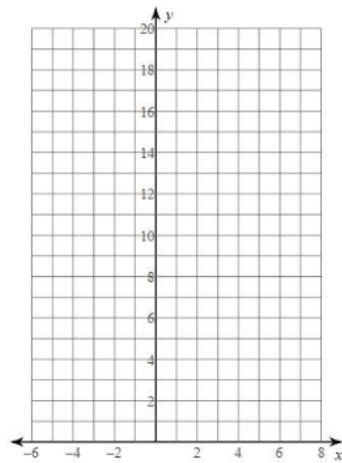


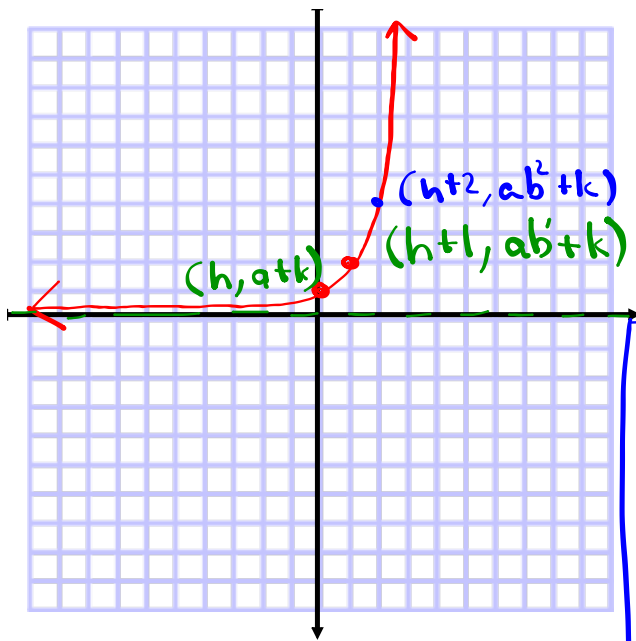
x	y
-3	1/108 = .009
-2	1/36 = .02
-1	1/12 = .08
0	1/4 = .25 a
1	3/4 = .75
2	9/4 = 2.25
3	27/4 = 6.75

3) $y = -3(2)^{x+2}$



4) $y = 5 \cdot 2^{x-1}$





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

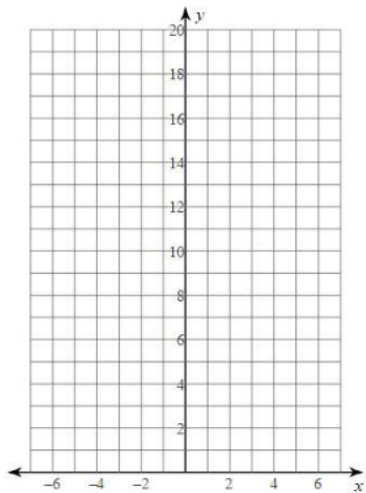
Asymptote: $y=k$

Parent $y = a(b)^x$

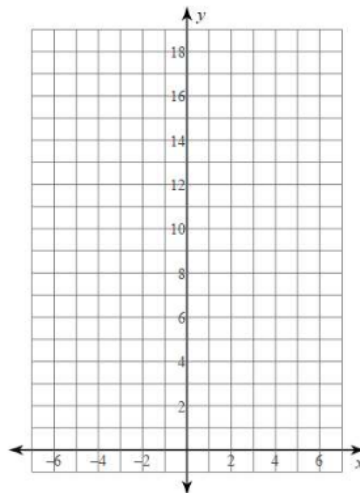
- \downarrow y-int "starting point"
- \downarrow growth/decay factor



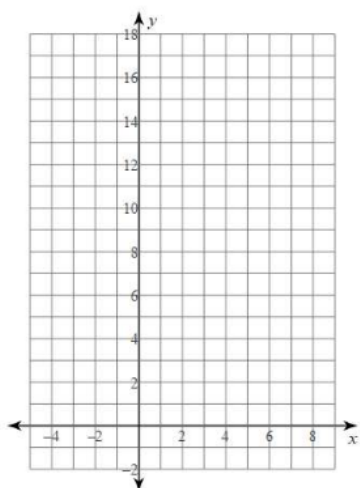
5) $y = 4 \cdot 2^x + 2$



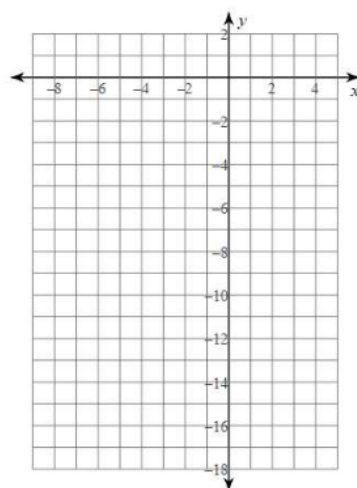
6) $y = 3(2)^x - 1$



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



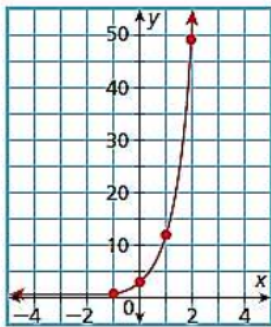
8) $y = -5 \cdot \left(\frac{1}{2}\right)^{x+2} + 2$



Characteristics of Exponential Functions

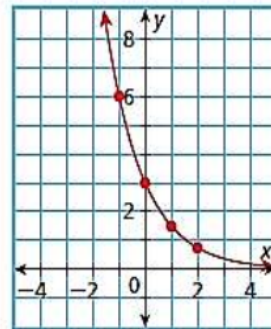
Y-Intercepts and Asymptotes

Y-Intercept		
Define: Point where the graph crosses the y-axis	Think: At what coordinate point does the graph cross the y-axis?	Write: (0, #) *look at graph or plug in 0 for x*
Asymptotes		
Define: A line that the graph get closer and closer to, but never touches or crosses.	Define: A line that the graph get closer and closer to, but never touches or crosses.	Define: A line that the graph get closer and closer to, but never touches or crosses.



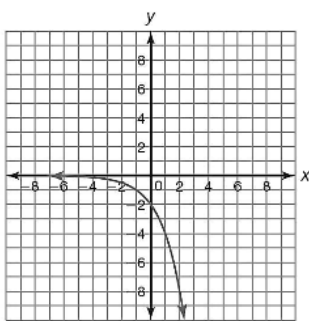
Y-intercept:

Asymptote:



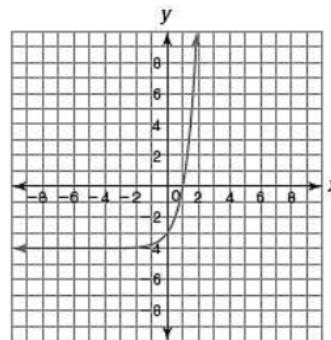
Y-intercept:

Asymptote:



Y-intercept:

Asymptote:

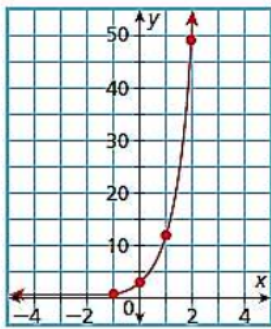


Y-intercept:

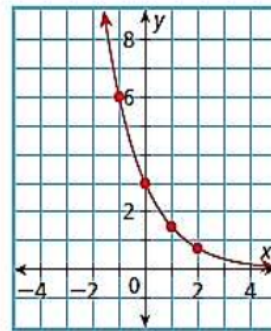
Asymptote:

Domain and Range

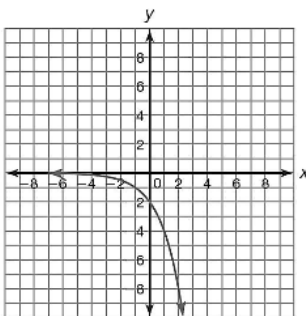
Domain		
Define: All possible values of x	Think: How far left to right does the graph go?	Write: $(-\infty, \infty)$ OR all real numbers
Range		
Define: All possible values of y	Think: How far down to how far up does the graph go?	Write: $(\#, \#)$ <i>(lowest y value, highest y value)</i> *will involve the asymptote and ∞ or $-\infty$ *



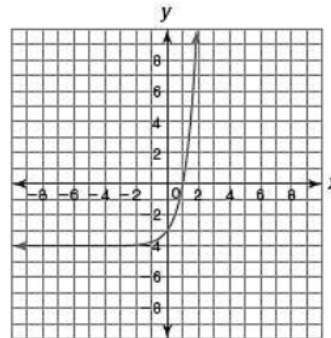
Domain:
Range:



Domain:
Range:



Domain:
Range:



Domain:
Range: