Today's Learning Goal(s):

Date: _____

By the end of the class, I will be able to:

a) graph exponential functions using transformations.

Last day's work: pp. 214-215 A – H
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4.6 Transformations of Exponential Functions

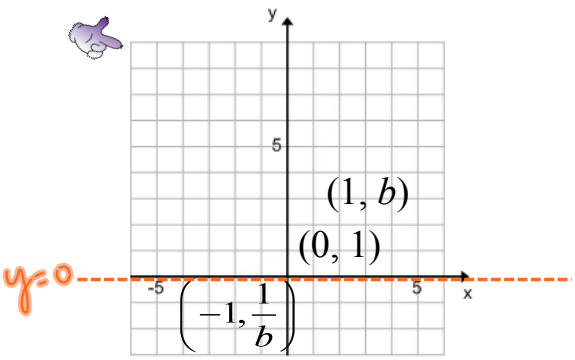
Date: Nov. 3/15

Recall: $y = af\left(k\left(x-d\right)\right)+c$

A new Parent Function

$y = b^x$

Same rules apply.
**don't forget to factor k out of $(kx - d)$



Features:

Horizontal Asymptote

x-axis ; $y = 0$

Domain

$\{x \in \mathbb{R}\}$

Range $\{y \in \mathbb{R} \mid y > 0\}$

If b>1, it is a growth function.

If **0<b<1**, it is a **decay** function.

Ex.1 Sketch the following.

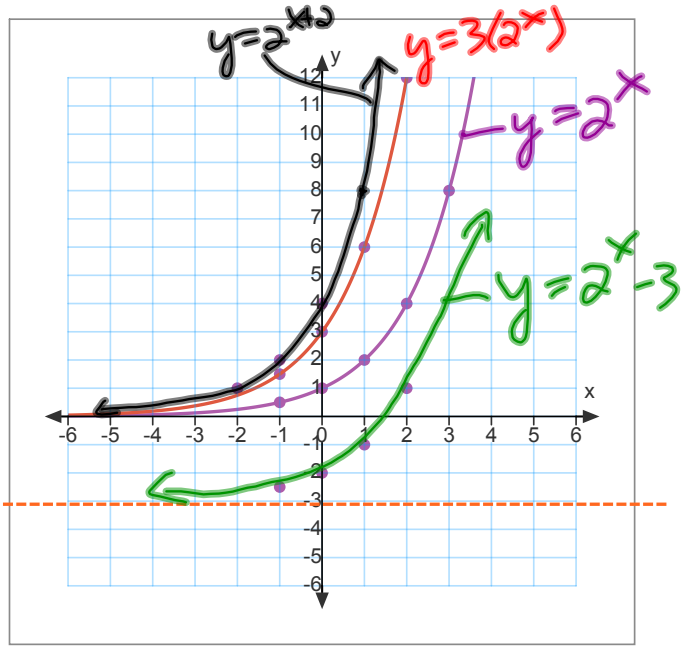
$y = 2^x$

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

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

$y = 2^x - 3$

$y = f(x) - 3$



$y = 2^{x+2}$

$y = f(x+2)$

$y = 3(2^x)$

$y = 3f(x)$

$(x, y) \to (x, 3y)$

ex $(0,1) \to (0,3)$

$(1,2) \to (1,6)$

Ex.2 Exponential Functions:
Name the base function and describe the transformations on each graph.

a) $f(x) = 2^{x-4} + 3$

base function $y = 2^x$
translated 3 units up
translated 4 units right

b) $g(x) = \frac{1}{3}\left(4^{x-2}\right) - 1$

base function $y = 4^x$
vert. translation 1 unit down
vertical compression by factor $\frac{1}{3}$
hor. translation 2 units right

c) $f(x) = \frac{1}{2}\left(5^{3x-9}\right) - 2$

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

vert. compression by a factor $\frac{1}{2}$
hor. compression by a factor $\frac{1}{3}$
hor. translation 3 units right
vert. translation 2 units down

d) $g(x) = -2\left(3^{-2x-4}\right) + 1$

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

vertical stretch by a factor of 2
reflection in the x-axis

horizontal compression by a factor of ½
reflection in the y-axis

horizontal translation 2 units left
vertical translation 1 unit up

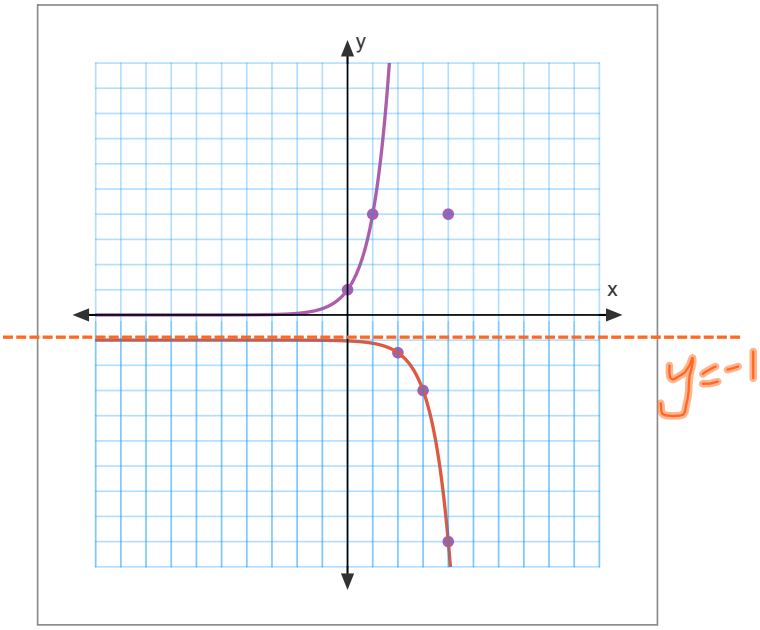
Ex.3 Sketch the graph of $y = -2(4^{x-3}) - 1$.
State the domain and range, and the y-intercept of the graph.

first: $y = (4^x)$

$(x, y) \rightarrow (x+3, -2y-1)$

$y = -2(4^{x-3}) - 1$

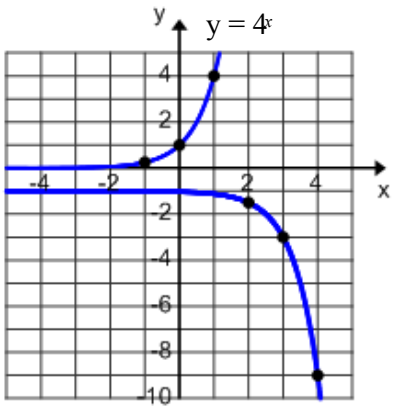
x	y
-1	
0	
1	



$y = -1$

$-1 \rightarrow +3 \mid 2$

$\frac{1}{4} \rightarrow -\frac{1}{4} \rightarrow -\frac{1}{2} \rightarrow -\frac{3}{2}$



$y = -2(4^{x-3}) - 1$

y-int, let $x = 0$

$y = -2(4^{0-3}) - 1$

$= -2(4^{-3}) - 1$

$y = -2(4^{x-3}) - 1$

D = $\{x \in \mathbb{R}\}$
R = $\{y \in \mathbb{R} \mid y < -1\}$
Hor. Asymptote: $y = -1$
y-intercept = -1.03125 *let $x = 0$ and solve

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 214-215 A – H
p. 216 #1, 2

Today's Homework Practice includes:

pp. 251-253 #1 – 5, 9, 10 [12 – 14]