Graphing Exponential Functions

(x_1, y_1) is "start" point

OR $f(x) = y_1 (b)^{x - x_1}$

common ratio (multiplier)

Exponential functions take the form $f(x) = a(b)^x$. The initial value is a when the exponent is equal to 0. The base is b, and this is the change factor, common ratio, or multiplier, that is used to get the next term from the previous term.

$(0, a)$ is y-intercept!

$\cdot \frac{1}{b}$ ← backward $\cdot b$ → forward

When graphing exponential functions, a complete graph includes:

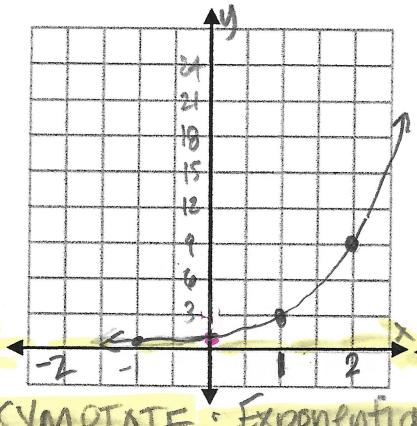
1. Make a table of values that include both negative and positive values of x. This is your reasoning/justification for the graph you are drawing.
2. Completely label the graph with scale and label the x & y axes
2. Plot the points from your table.
4. Draw a curve that fits the graph. Be sure to draw arrows. (assuming continuous!)

Graph each exponential. Make a table. Completely label the graph.

1. $f(x) = 3^x$ $1 \cdot 3^{x-0}$ $r = 3$

x	$f(x)$
−3	$\frac{1}{27}$
−2	$\frac{1}{9}$
−1	$\frac{1}{3}$
0	1
1	3
2	9
3	27

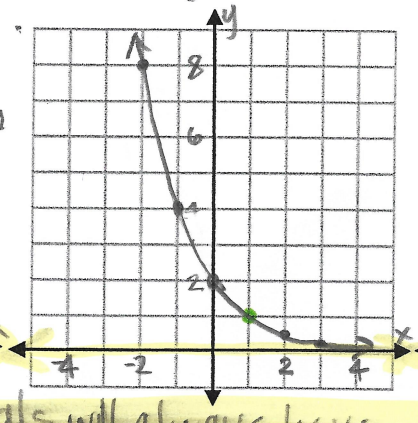
$\cdot \frac{1}{3}$, $\cdot \frac{1}{3}$, $\cdot \frac{1}{3}$, $\cdot 3$, $\cdot 3$, $\cdot 3$



2. $f(x) = 1\left(\frac{1}{2}\right)^{x-1}$ ((1,1) is "start") $r = \frac{1}{2}$

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

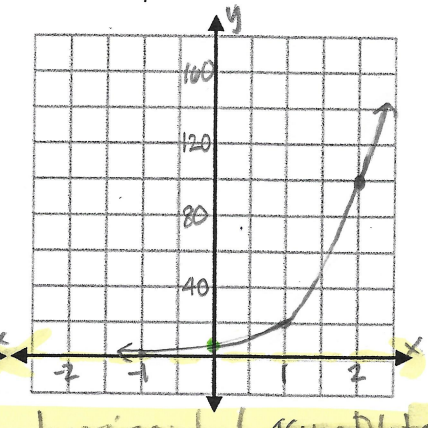
$\cdot 2$, $\cdot 2$, $\cdot 2$, $\cdot \frac{1}{2}$, $\cdot \frac{1}{2}$, $\cdot \frac{1}{2}$



3. $f(x) = 4(5)^{x-0}$ "start" (0,4) $r = 5$

x	$f(x)$
−3	$\frac{4}{125}$
−2	$\frac{4}{25}$
−1	$\frac{4}{5}$
0	4
1	20
2	100
3	500

$\cdot 5$, $\cdot 5$, $\cdot 5$



ASYMPTOTE: Exponentials will always have a horizontal asymptote!

(Asymptote is a line that a function gets closer to, but never actually touches it!)