AGS 3 Name: ______________________________ Period: _____ Date: __________

Notes 2.2 – Graphing Logs

Warmup – Write the value of each logarithmic expression

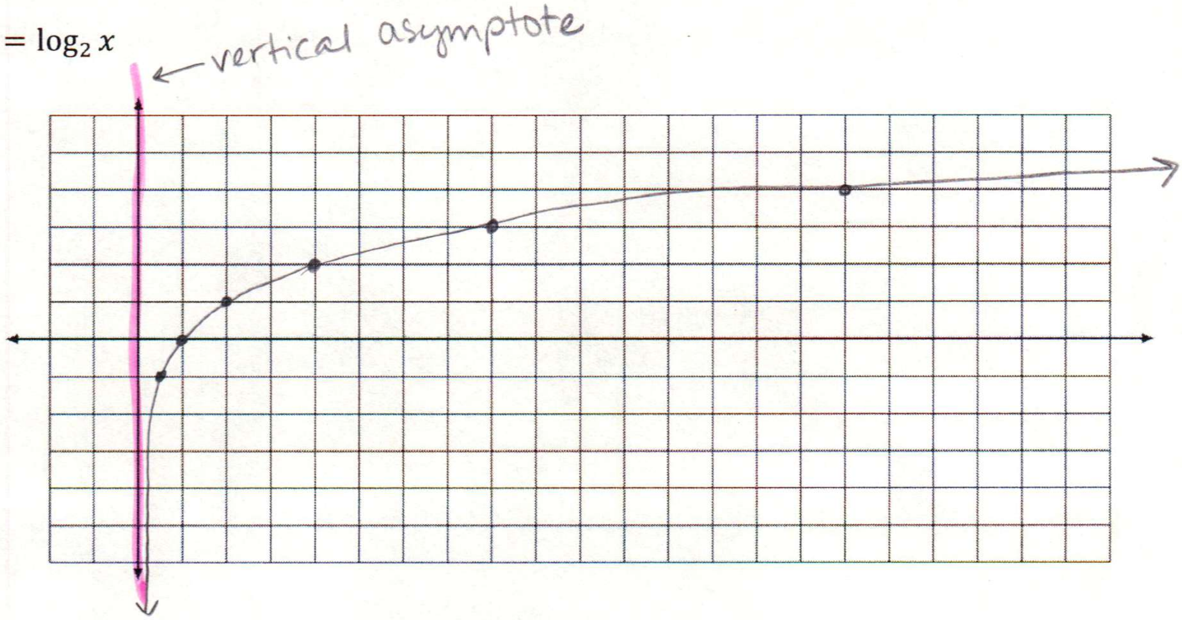
1. $\log_5 625 =$ 4
2. $\log_3 243 =$ 5
3. $\log_5 0.2 =$ −1 (0.2 → $\frac{1}{5}$)
4. $\log_9 81 =$ 2
5. $\log 1{,}000{,}000 =$ 6
6. $\log_x x^7 =$ 7

Investigation

Create a table to graph each logarithmic function.

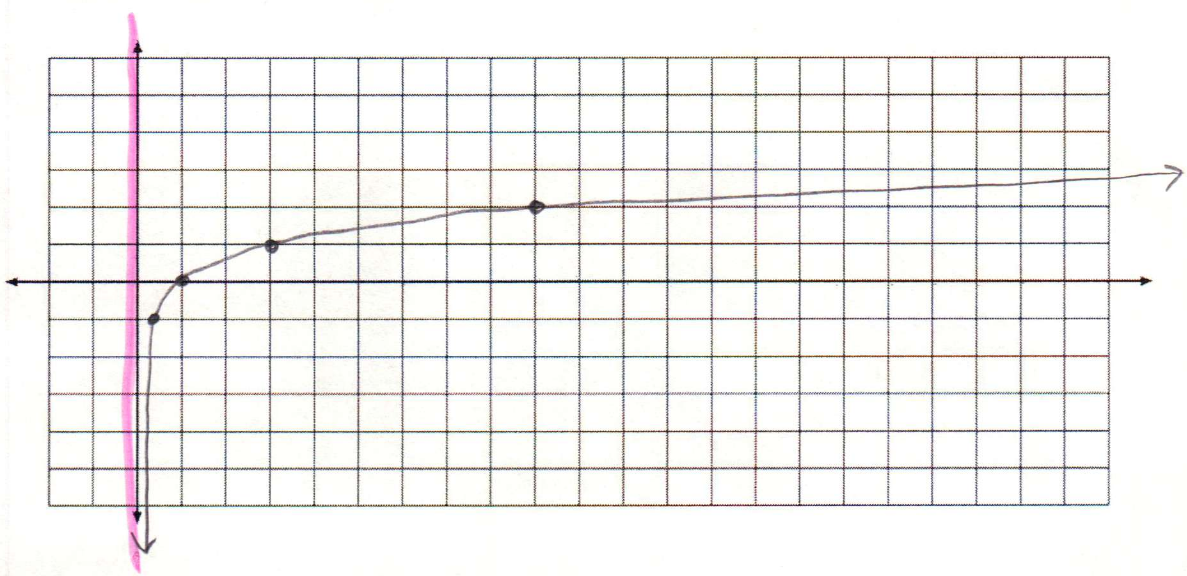
a. $f(x) = \log_2 x$

x	y
$\frac{1}{2}$	-1
1	0
2	1
4	2
8	3
16	4



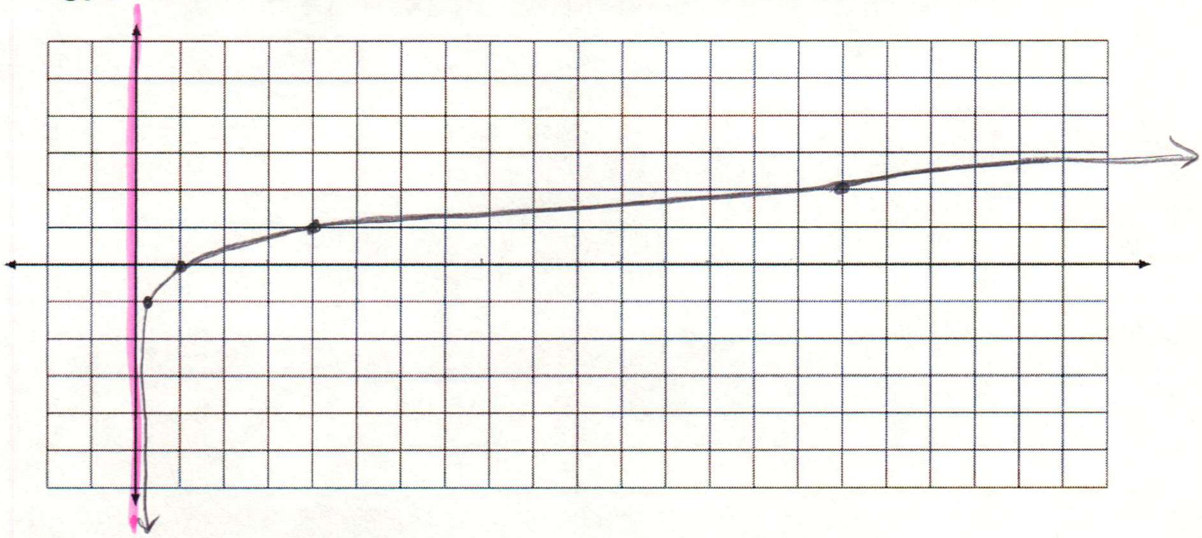
b. $f(x) = \log_3 x$

x	y
$\frac{1}{3}$	-1
1	0
3	1
9	2
27	3



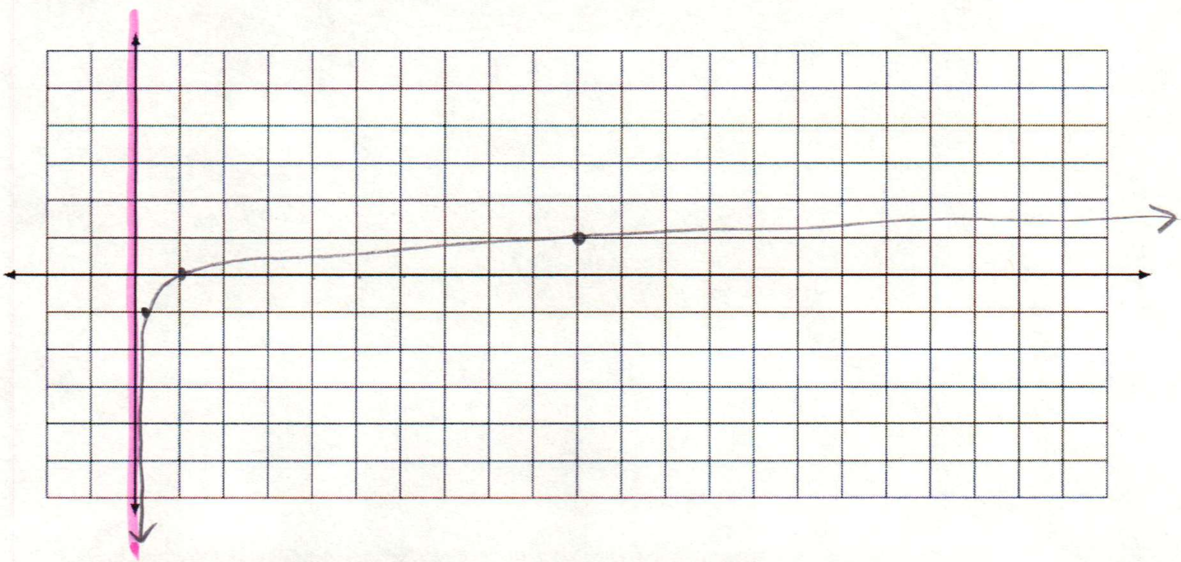
c. $f(x) = \log_4 x$

x	y
$\frac{1}{4}$	-1
1	0
4	1
16	2
64	3



d. $f(x) = \log_{10} x$

x	y
$\frac{1}{10}$	-1
1	0
10	1
100	2



e. What similarities do you see in the graphs?

They all approach the y-axis
They grow very slowly after x=1

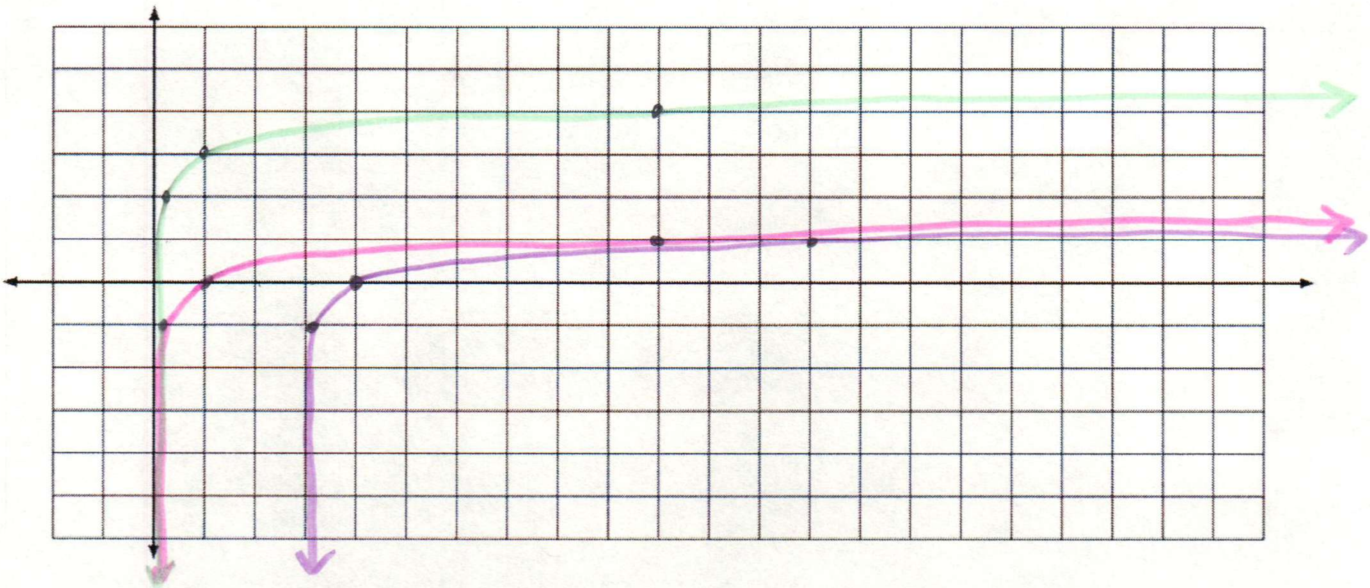
f. What differences do you see in the graphs?

The bigger the base the more stretched out it gets

g. What is the effect on the graph of changing the base on the logarithm?

How quickly or slowly it grows,
small bases grow faster than bigger bases.

Using Desmos, graph each of these graphs on the same graph (use different colors). Note how each change to the original function transforms the graph. The variable a can be any number of your choice.



h. $f(x) = \log_{10} x$ (parent function)

i. $f(x) = a + \log_{10} x$ $a = 3$

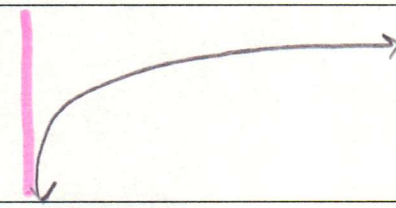
j. $f(x) = \log_{10}($~~$x + a$~~ $x - b)$ $b = 3$

vertical shift ↓

$$f(x) = a + \log(x - b)$$

horizontal shift (opposite)

Vocabulary

Word	Meaning/Notation	Example
Asymptote	A line that a graph approaches, but never touches or crosses	 x = #