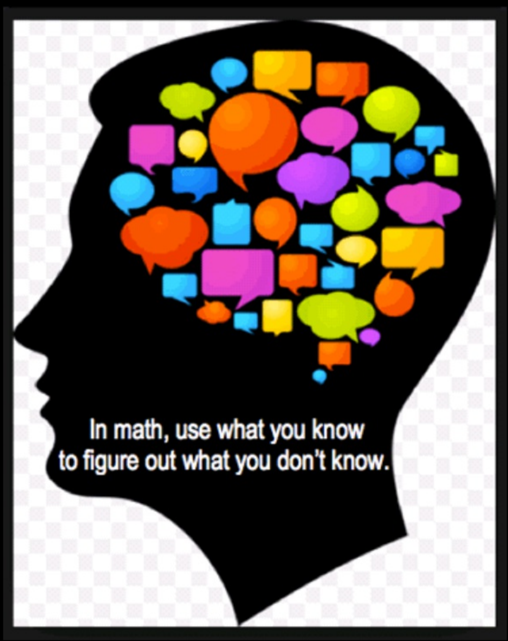


Again, use what you know about transformations to graph logarithmic functions.

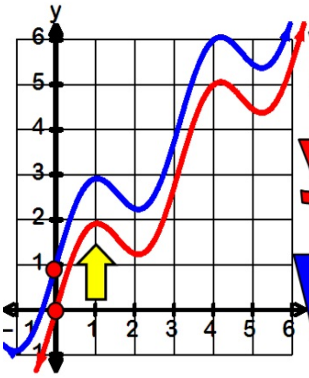
+/- after function moves up/down

+/- within function moves left/right

a -x...flips over y

a negative in front...flips over x

Translations

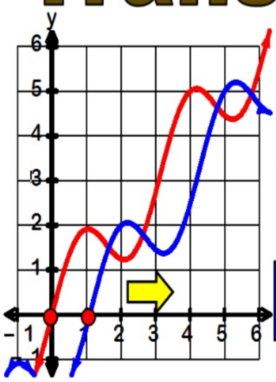


y=f(x)+A

y=f(x)

Vert Shift

Translations

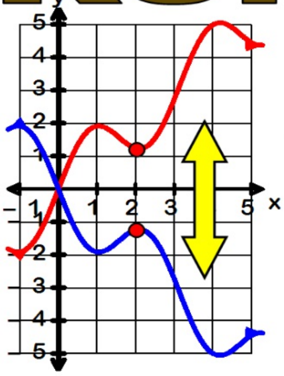


y=f(x-A)

y=f(x)

Horo Shift

Reflect

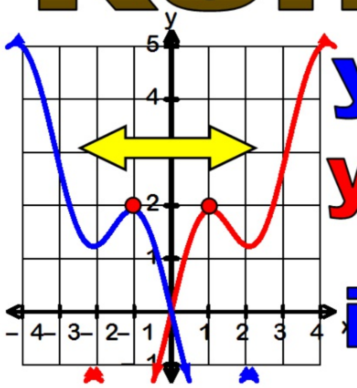


$y=-f(x)$

$y=f(x)$

in x axis

Reflect



$y=f(-x)$

$y=f(x)$

in y axis

Translated

$$y = \log_2(x-1) + 2$$

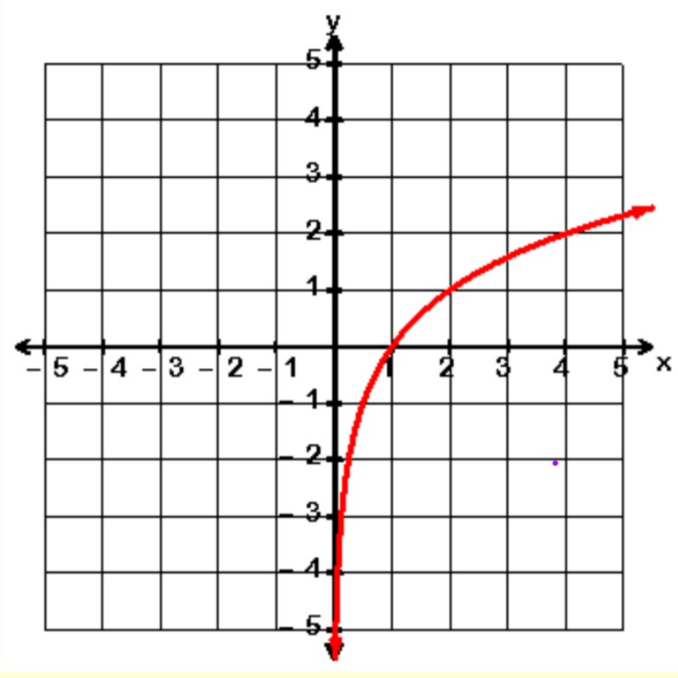
Size

Move Rt 1

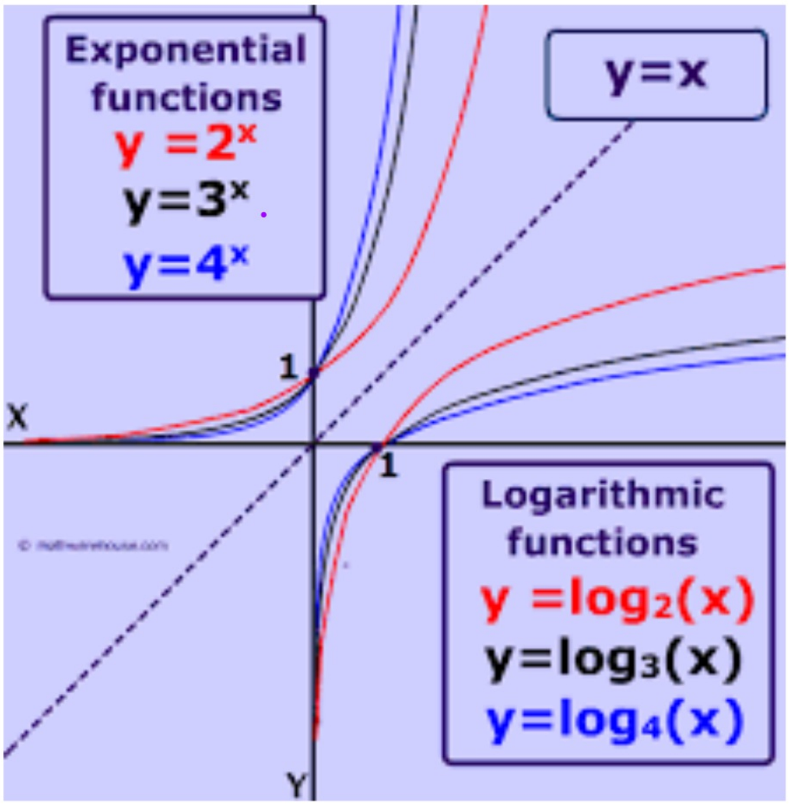
Move up 2

Graph of y = log x
Basic shape-
domain (0,∞)
range- (-∞,∞)
x-intercept@ (1,0)
no y-intercept
VA at x = 0

$y = \log_2 x$



By the way... logarithmic functions are inverses to exponential....so their graphs have symmetry about y = x.



Sketch $y = \log_2 x$

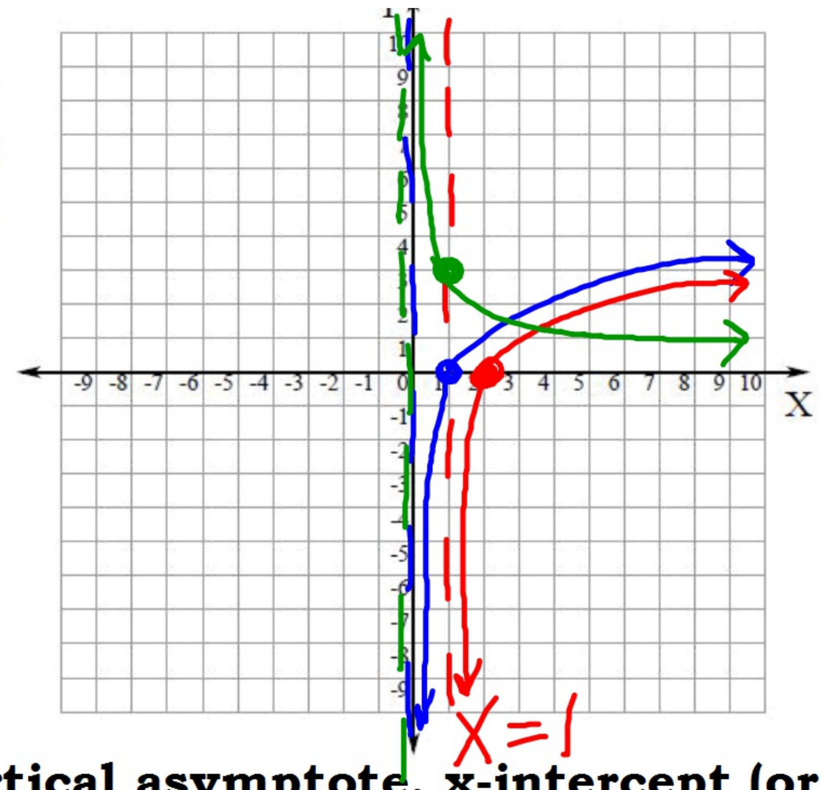
with $y = \log_2(x-1)$

and $y = -\log_2 x + 3$

VA @ $x=0$

d: $(0, \infty)$

r: $\mathbb{R}$



Determine the vertical asymptote, x-intercept (or translated intercept), domain and range

Determine the domain,
range and vertical
asymptote of:

1. y = log x +1
moved up 1
d:(0,inf), r: all reals VA @ x = 0

2. y = log (x+1)
moved left one
d(-1,inf) r: all reals VA @ x = -1

3. y = - log x
flipped upside-down
d:(0,inf), r: all reals VA @ x = 0

4. y = log (-x)
flipped over the y-axis
d:(-inf,0), r: all reals VA @ x = 0

5. y = log x -3
moved down 3
d:(0,inf) r: all reals VA @ x = 0

Only translations moving left or right will affect the vertical asymptote.
So, the arugment, or expression in parenthesis (like #2) will have a different asymptote.

Suggested Practice
Sec 4.2
page 466
47-52 matching
odds 53-65, 73

Sec 4.2

47. $1 - \log_3 x$

48 $\log_3(-x)$

49. $\log_3 x - 1$

50. $-\log_3 x$

51. $\log_3(x-1)$

52. $\log_3 x$

53. VA @ $x = -1$
d: $(-1, \infty)$
r: $(-\infty, \infty)$ ←

55. VA @ $x = 0$ ←
d: $(0, \infty)$
r: $(-\infty, \infty)$ ←

57. Same ↑

graph solutions
See back of text plus