C.5 Day 4:
Graphing Logarithmic Functions

$$y = a \log_b (x - h) + k$$

a - value
Stretch if greater than 1
Shrink if between 0 and 1
Reflect over x-axis if negative

Horizontal Shift
Left or Right
Opposite Sign!!!

b - value ("the base")
Logarithmic Growth or Decay
Growth if greater than 1
Decay if between 0 and 1

Vertical Shift
Up (+) or Down (-)

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Ex.1 First list the exponential parent function, then describe in words the transformations.

$y = \log_3(x+2) - 4$

Parent Exponential Function:

$y = 3^x$

Transformations:

left 2, down 4

$y = \frac{1}{2}\log_2 x + 3$

Parent Exponential Function:

$y = 2^x$

Transformations:

Shrink by 1/2, up 3

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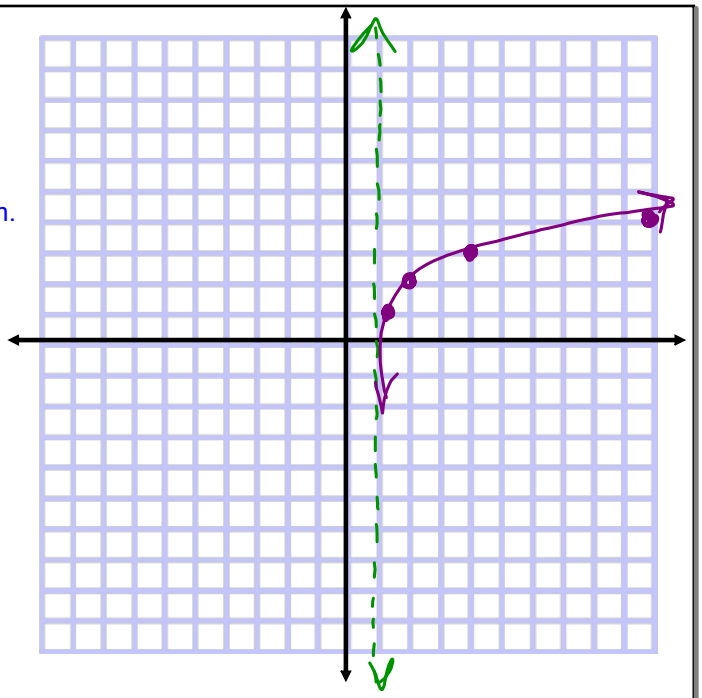
Ex2. Graph.

$$y = \log_3(x-1)+2$$

1. Graph the exponential parent graph form.
2. Switch x and y coordinates. So you now have the log parent graph.
3. ~~Apply stretch or compression.~~
4. Apply shifts.

Right 1 and up 2

V.A.: $x=1$



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Ex3. Graph.

$$y = -3\cdot\log_2(x+4)$$

Growth or Decay? Growth

Exponential Parent: $y=2^x$

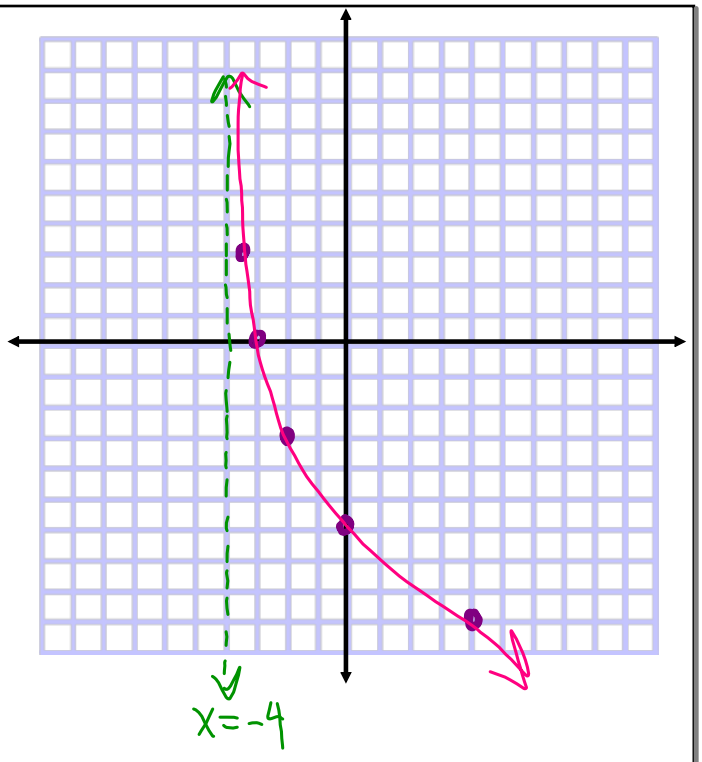
Transformation Description:

Reflect over x-axis, stretch by 3, left 4.

Vertical Asymptote: $x=-4$

Domain: $x>-4$

Range: $y: \mathbb{R}$



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