

Transformations of Logarithmic Functions

In general: $y = af[k(x - p)] + q$

For the logarithmic function, $y = \log_b x$, this becomes:

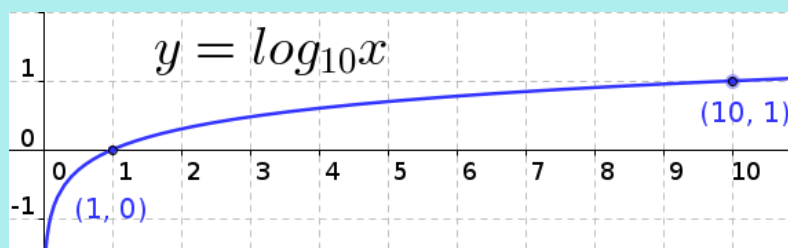
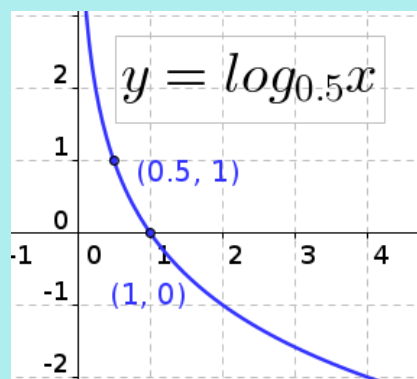
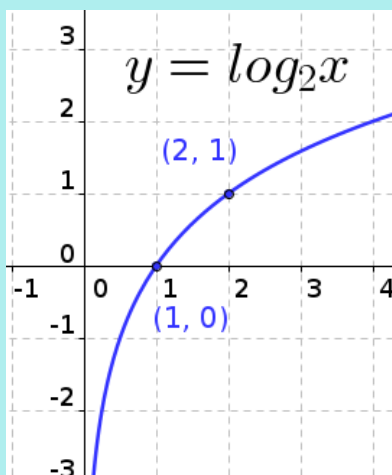
$$y = a \log_b [k(x - p)] + q$$

(note the base can be represented as 'b' to avoid confusion with the scale factor 'a')

Key features of parent, $y = \log_b x$

- (1) vertical asymptote: $x = 0$
- (2) x-intercept at $(1, 0)$
- (3) always a point at $(b, 1)$

The parent logarithmic function $y = \log_b x$ will have convenient key points at $(1, 0)$ and $(b, 1)$



Transformation Strategies:

(1) Transform asymptote, $x = 0$, by horizontal shift p .

(2) Transform key points $(1,0)$ and $(b,1)$ using

$$(x, y) \rightarrow \left(\frac{x}{k} + p, ay + q \right)$$

Note: A third point may be required.

(3) The domain depends on the asymptote and any horizontal reflections.

Assigned Work:

p.456 # 1 - 3, 4, 5, 8, 9, 11

H/W # 11

