

Transformations

$$y = a(b)^{x-h} + k$$

$h \rightarrow +$ shift left

$h \rightarrow -$ shift right

$k \rightarrow +$ shift up

$k \rightarrow -$ shift down

sign $\left\{ \begin{array}{l} a \rightarrow - \text{ reflect} \\ a \rightarrow + \text{ no reflection} \end{array} \right.$

number $\left\{ \begin{array}{l} a \rightarrow a > 1 \text{ stretch} \\ a \rightarrow a < 1 \text{ shrink} \end{array} \right.$

$b \rightarrow b > 1$ growth

$b \rightarrow 0 < b < 1$ decay

$\ast b$ is never neg

ie: $y = -2^x$

$a = -1 \rightarrow$ reflect

$b = 2 \rightarrow$ growth

Asymptote
 $y = k$

y-int
 $(0, a)$
 $(0, a+k)$

ex) $5^x \rightarrow 1(5)^x - 6$

growth

down 6

asymptote $y = 6$

y-int $(0, 1-6) \rightarrow (0, -5)$

$$\text{ex2: } 3^x \rightarrow \frac{a(b)^{x-h}}{x-z}$$

$$a = \frac{3}{4} \rightarrow \text{shrink}$$

$$b = 3 \rightarrow \text{growth}$$

$$h = 2 \rightarrow \text{right } 2$$

$$\text{asymptote} \rightarrow y = 0$$

$$y\text{-int} \rightarrow (0, \frac{3}{4})$$

$$\text{ex3: } 2^x \rightarrow -\frac{1}{2}(2)^{x+2} + 4$$

$$a = -\frac{1}{2} \rightarrow \text{reflect, shrink by } \frac{1}{2}$$

$$b = 2 \rightarrow \text{growth}$$

$$h = -2 \rightarrow \text{left } 2$$

$$k = 4 \rightarrow \text{up } 4$$

$$\text{asymptote} \rightarrow y = 4$$

$$y\text{-int} \rightarrow (0, -\frac{1}{2} + 4) \rightarrow (0, 3.5)$$