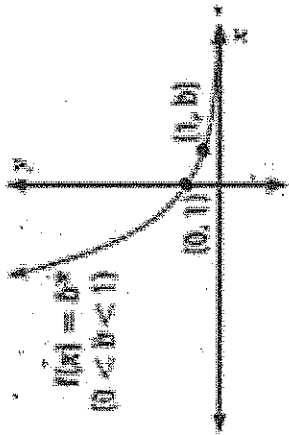


Exponential Decay:

a function of the form $y=ab^x$ where $a > 0$ and $0 < b < 1$

Decay factor: b



parent function

Asymptote: a line that a graph approaches more and more closely

Domain: $x \in \mathbb{R}$

Range: $y > 0$

a function of the form $y=ab^x$ where $a \neq 0$ and the base b is a positive number other than 1

Compound Interest

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

P = initial principal

r = rate (decimal)

n = # of times compounded in a year

t = amount after t years

Ex 5: You deposit \$2900 in an account that pays 3.5% interest. Find the balance after 2 years if the interest is compounded monthly and annually.

a. monthly: $n = 12$

$r = 3.5\%$

$$A = 2900 \left(1 + \frac{0.035}{12} \right)^{2 \cdot 12}$$

$$A = \$3109.96$$

b. annually: $n = 1$

$$A = \$3106.55$$

Ex. 6: A new TV costs \$1200. The value of the TV decreases by 21% each year. Write an exponential decay model giving the TV's value y (in dollars) after t years. Estimate the value after 2 years.

$$y = a(1-r)^t$$

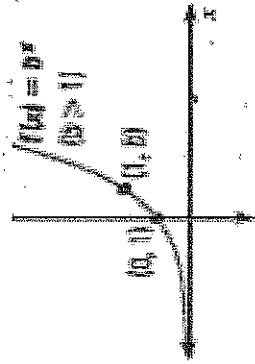
$$y = 1200(1-0.21)^2$$

The value after 2 years: $y = \$748.92$

Exponential Growth:

a function of the form $y=ab^x$ where $a > 0$ and $b > 1$

Growth factor: b



parent function

Asymptote: a line that a graph approaches more and more closely

Domain: $x \in \mathbb{R}$

Range: $y > 0$

Exponential Function:

$$y = ab^{x-h} + k$$

a: reflection

h: shift left/right

k: shift up/down

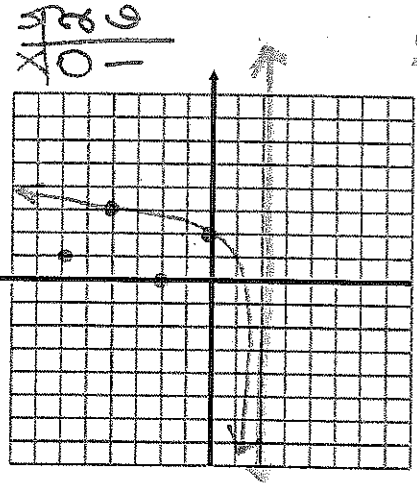
$$D: \mathbb{R}$$

$$R: y > -2$$

Ex. 1: Graph the function

$$y = 2 \cdot 3^{x-2} - 2$$

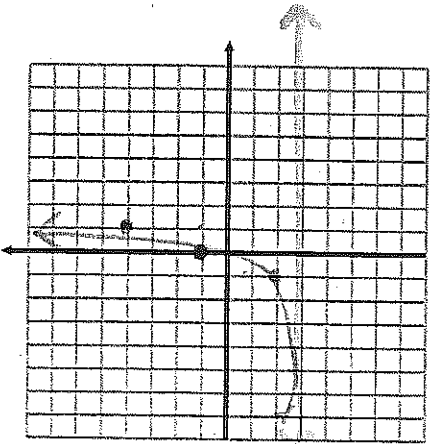
$$y = 2 \cdot 3^x$$



h: 2, k: -2 ← controls

Try it! Graph the function

$$y = 4^{x-1} - 3$$



$$h: -1$$

$$k: -3$$

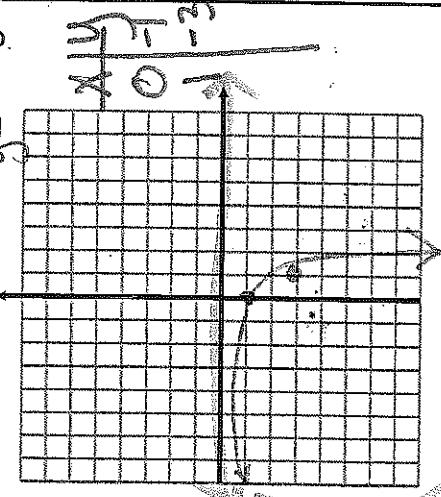
$$D: \mathbb{R}$$

$$R: y > -3$$

Ex. 2: Graph the function $y = -3^x$.

State the domain and the range.

$$y = -1 \cdot 3^x$$



$$k: 0$$

asymptote

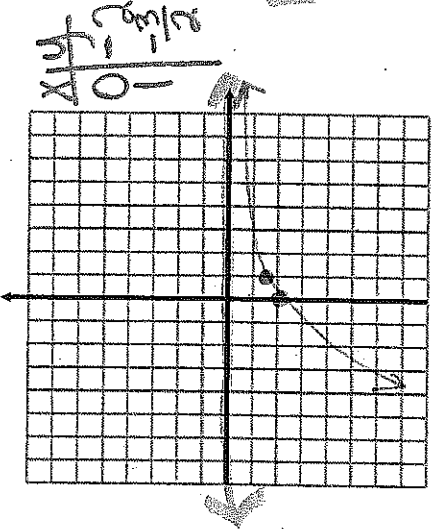
reflected

$$D: \mathbb{R}$$

$$R: y < 0$$

Ex. 3: Graph the function

$$y = -2 \cdot \left(\frac{3}{4}\right)^x + 0$$



$$k: 0$$

reflected

$$D: \mathbb{R}$$

$$R: y < 0$$

$$y = ab^{x-h} + k$$

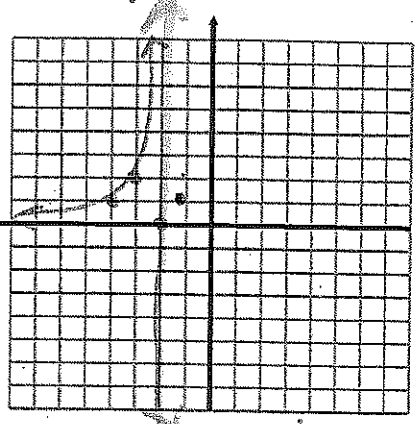
a: reflection

h: shift left/right

k: shift up/down

Ex. 4: Graph the function

$$y = 2 \cdot \left(\frac{3}{5}\right)^{x-1} + 2$$



$$h: 1$$

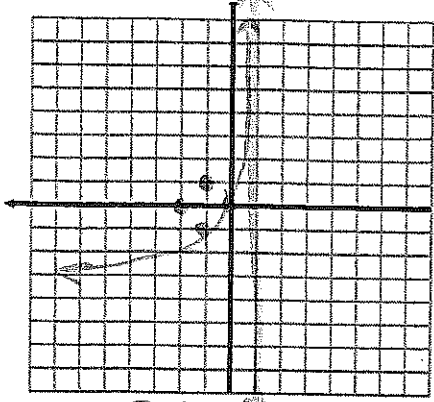
$$k: 2$$

$$D: \mathbb{R}$$

$$R: y > 2$$

Try it! Graph the function

$$y = (2)0.5^{x+1} - 1$$



$$h: -1$$

$$k: -1$$

$$D: \mathbb{R}$$

$$R: y > -1$$