

Exponential Functions 1 - Exponential Growth

Standards: F.IF.7e - Graph exponential functions
F.LE.1 - Distinguish...situations that can be modeled...with exp. functions

Learning Targets:

-How do you graph an exponential growth function?

Congratulations! You've won a contest. You have two choices for your prize:

Prize#1

\$10,000 a day for a month

Prize#2

\$0.01 given on the first day
then double your money every
day for the rest of the month

Which do you choose?

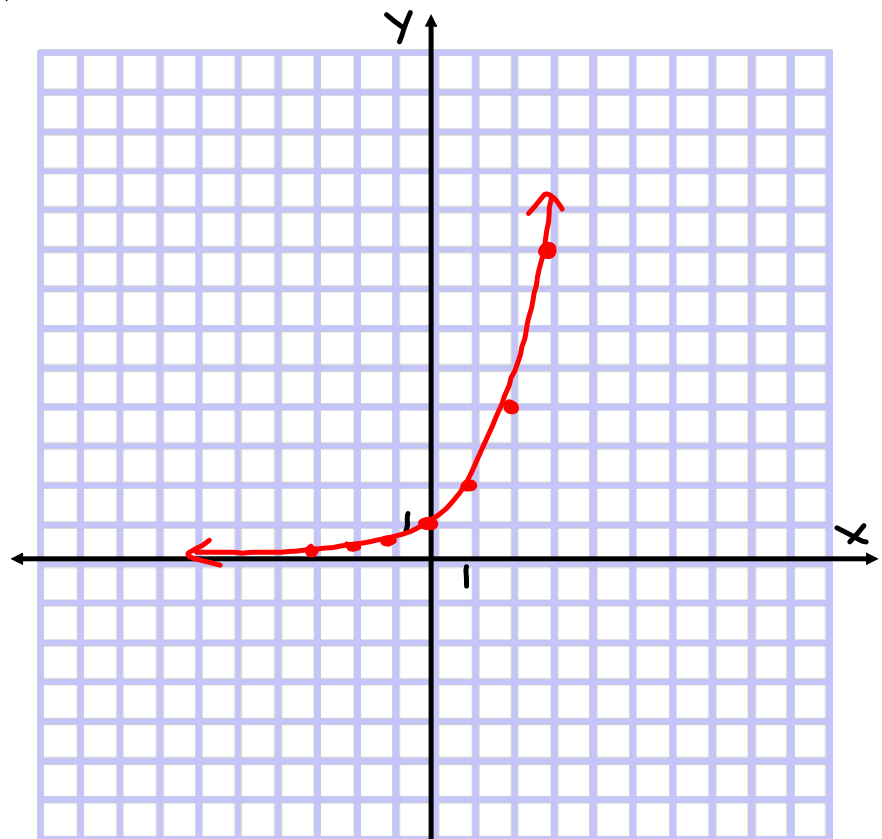
Exponential Function has the form

$$f(x) = b^x$$

(b is a positive number other than 1)

Example: $f(x) = 2^x = 2^{-3}$

x	f(x)
-3	0.125
-2	0.25
-1	0.5
0	1
1	2
2	4
3	8



Asymptote

a line that a graph approaches as you move away from the origin (in this case, the graph will never touch it!)

Graphing

(erase to show)

$$f(x) = a \cdot b^x$$

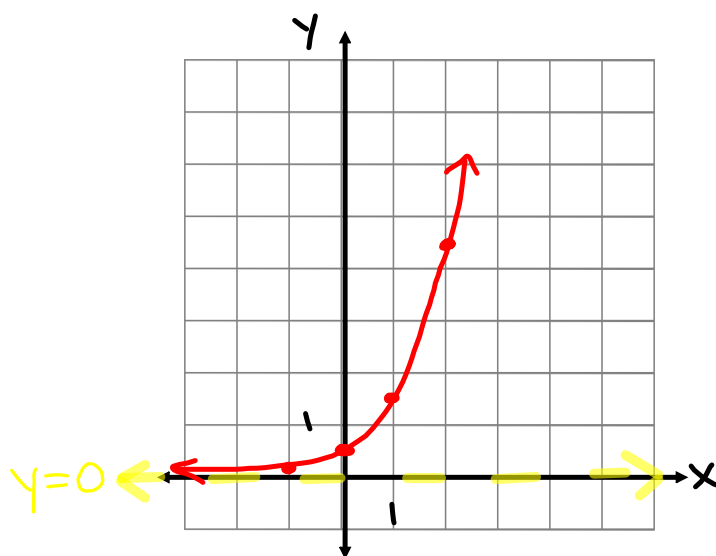
- the graph passes through the point (0, a)
- the x-axis is the asymptote $(y=0)$
- domain = all real numbers \mathbb{R} $(-\infty, \infty)$
- range is $y > 0$ if $a > 0$
- $y < 0$ if $a < 0$

★ If $a > 0$ and $b > 1$ then its an
exponential GROWTH function! ★

example 1:Graph: $f(x) = \frac{1}{2} \cdot 3^x$

$$\left(\frac{1}{2}\right) \cdot 3^x$$

x	f(x)
-1	0.17
0	0.5
1	1.5
2	4.5

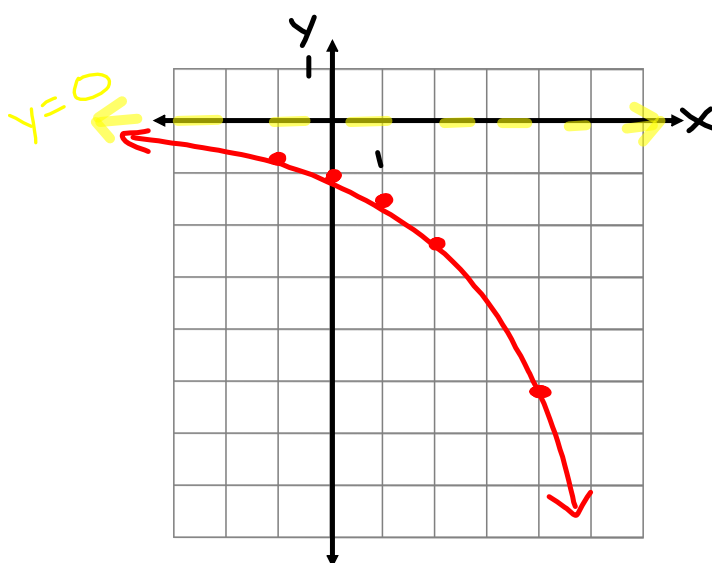
asymptote: $y=0$ domain: \mathbb{R} range: $y > 0$ y-int: $(0, 0.5)$ 

example 2:

Graph: $f(x) = -\left(\frac{3}{2}\right)^x$

X	Y
-1	-0.67
0	-1
1	-1.5
2	-2.25

4 -5.1
 asymptote: $y=0$
 domain: \mathbb{R}
 range: $y < 0$
 y-int: $(0, -1)$

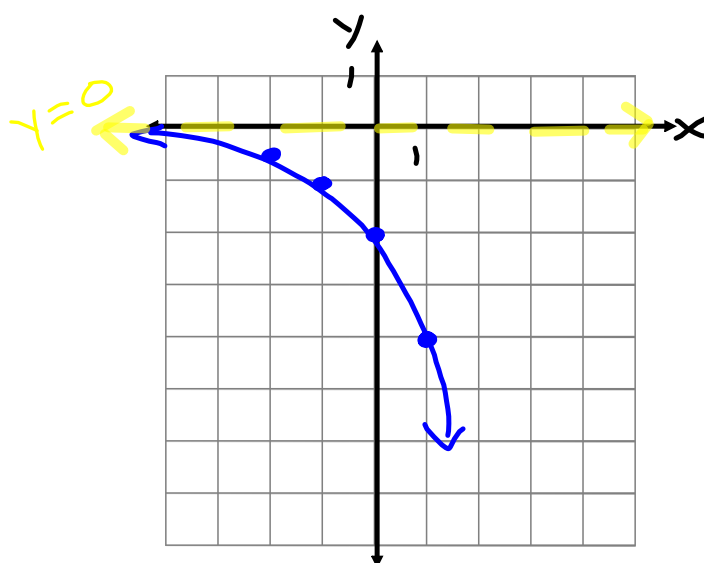


example 3:

Graph:

$$f(x) = -2 \cdot (2)^x$$

X	Y
-2	-0.5
-1	-1
0	-2
1	-4

asymptote: $y=0$ domain: \mathbb{R} range: $y < 0$ y-int: $(0, -2)$ 

General Exponential Function:

$$f(x) = ab^{x-h} + k$$

To Graph:

- sketch $f(x) = ab^x$
- shift graph **h** units left/right
- shift graph **k** units up/down

Example 4:

Graph.

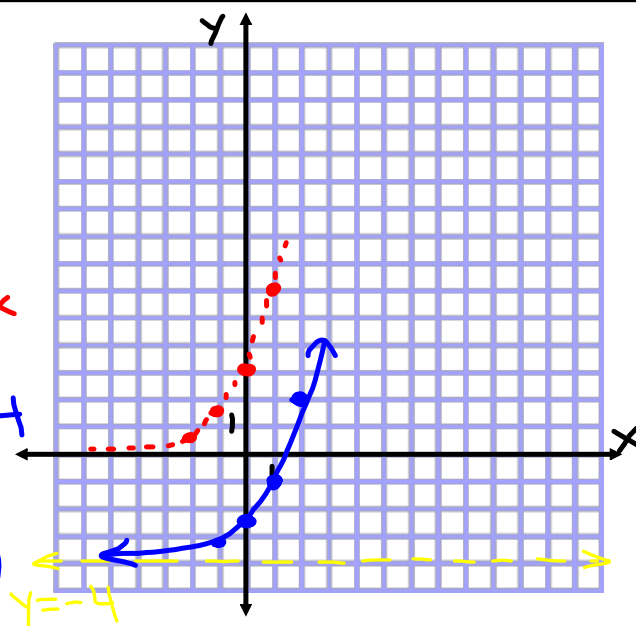
$$f(x) = 3 \cdot 2^{x-1} - 4$$

X	Y
-1	1.5
0	3
1	6
-2	0.75

$$f(x) = 3 \cdot 2^x$$

$$h=1 \quad k=-4$$

(1 right
4 down)



asymptote: $y = -4$

domain: \mathbb{R}

range: $y > -4$

y-int: $(0, -2.5)$

$$f(0) = 3 \cdot 2^{(0-1)} - 4$$

Example 5:Graph. $f(x) = -3^x - 2$

X	Y
-1	-0.33
0	-1
1	-3
2	-9

$$f(x) = -3^x$$

$$h=0 \quad k=-2$$

(2 down)

asymptote: $y = -2$ domain: \mathbb{R} range: $y < -2$ y-int: $(0, -3)$ 