Graphing Exponential Functions

When you graph exponential functions, you will perform the following steps:

Graphing Exponential Functions Steps

1. Create an x-y chart with 5 values for x (Use table feature to pick 5 values)
2. Substitute those values into the function and record the y or f(x) values.
3. Graph each ordered pair on a graph.

Graphing Exponential Functions (Shortcut)

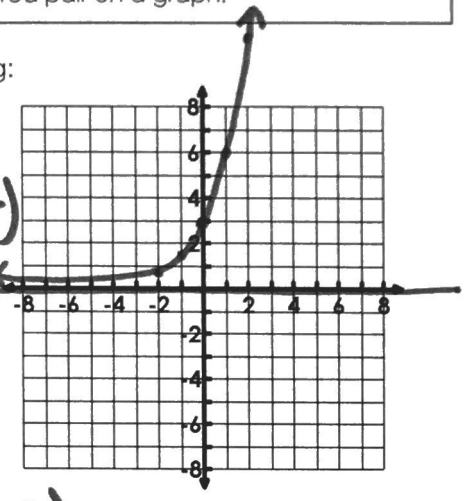
1. Determine if the graph is growth or decay
2. Graph your asymptote
3. Plot your y-intercept
4. Create exponential "sketch" through these points.

Graph the following:

a. $y = 3(4)^x$

x	y
-2	.75
-1	1.5
0	3
1	6
2	12

$(\frac{3}{4})$ $(\frac{3}{2})^x$

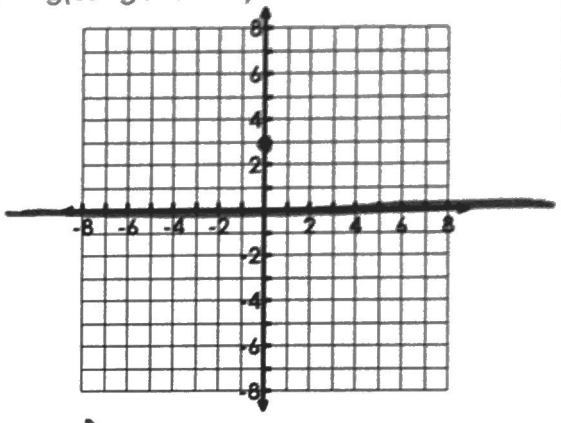


Y-intercept: (0, 3) Asymptote: y = 0

Graph the following(using shortcut):

a. $y = 3(4)^x$

x	y
-2	.75
-1	1.5
0	3
1	6
2	12



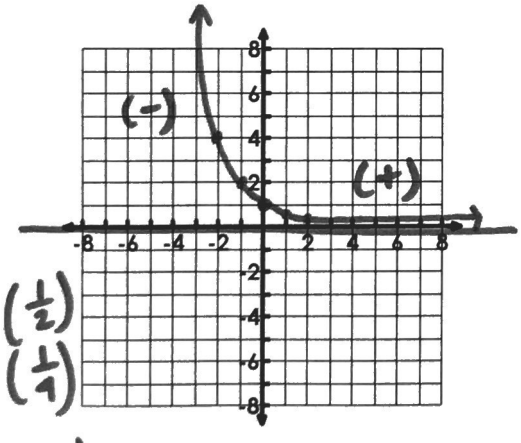
Y-intercept: (0, 3) Asymptote: y = 0

Practice:

b. $y = \left(\frac{1}{2}\right)^x$

x	y
-2	4
-1	2
0	1
1	0.5
2	.25

$(\frac{1}{2})$ $(\frac{1}{4})$



Y-intercept: (0, 1) Asymptote: y = 0

Growth/ Decay? Decay

Domain: $\mathbb{R}$

Range: $y > 0$

X-intercept: NO SOLUTION

Y-intercept: (0, 1)

Asymptote: y = 0

End Behavior:

$a\ x \to -\infty, f(x) \to \infty$

$a\ x \to \infty, f(x) \to 0$

Think about it...

What did you notice about the y-intercept and the equation?

You have two ways you can find the y-intercept when given an equation: $y = 3(4)^x$

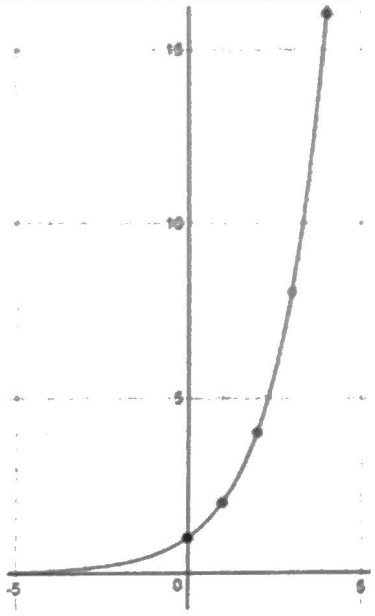
a. plugging 0 in for x & solving for y

b. a term of exponential function

Exponential Functions

Exponential Functions
$y = a \cdot b^x$ or $y = ab^x$

1. Variable is in the exponent (power) versus the base (x term)
2. Start small and increase quickly or vice versa
3. Asymptotes (heads towards a horizontal line but never touches it)
4. Constant Ratios (b term) (multiply by same number every time)



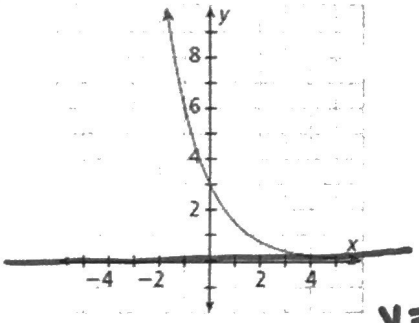
Asymptotes

An **asymptote** is a line that an exponential graph gets closer and closer to but never touches or crosses. **The equation for the line of an asymptote for a function in the form of f(x) = ab^x is always y =** 0.

General Form

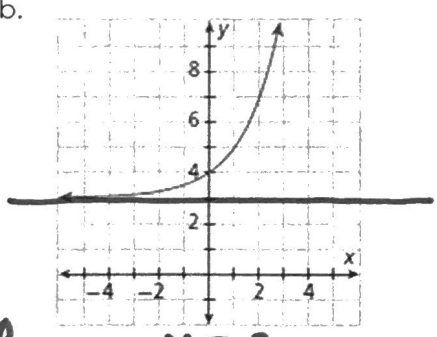
Identify the asymptote of each graph.

a.



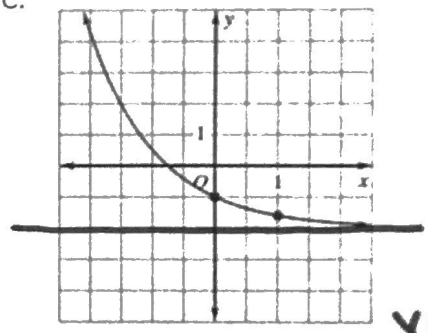
y=0

b.



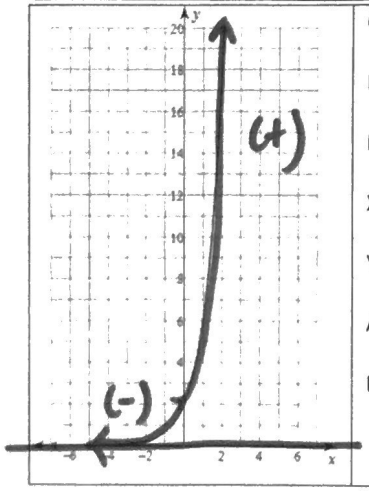
y = 3

c.



y=-2

Characteristics of Exponential Functions



Growth/ Decay? Growth

Domain: all real #'s

Range: $y > 0$

X-intercept: NO SOLUTION

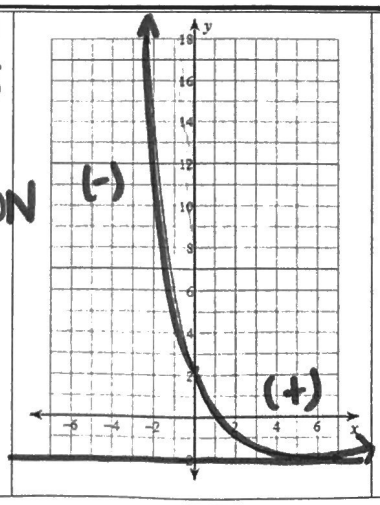
Y-intercept: (0, 2)

Asymptote: $y = 0$

End Behavior:

$a\,x \to -\infty, f(x) \to$ 0

$a\,x \to \infty, f(x) \to$ ∞



Growth/ Decay? Decay

Domain: $\mathbb{R}$

Range: $y > -2$

X-intercept: (1, 0)

Y-intercept: (0, 2)

Asymptote: $y = -2$

End Behavior:

$a\,x \to -\infty, f(x) \to$ ∞

$a\,x \to \infty, f(x) \to$ -2