

1ST 10

- Grab a graphing calculator
- Grab a new note packet
- Find all your homework for Unit 9 and put it in order of Days (Days 1 – 9)
- Find your grade sheet on the side table and highlight every grade you are not happy with.
 - What can you start doing in this unit that will make you proud of yourself?



DAY 1: GRAPHING EXPONENTIAL FUNCTIONS

Unit 10: Exponential Functions

EXPLORING

Exploring with Graphs: Graph the following equations:

a. $y = x$

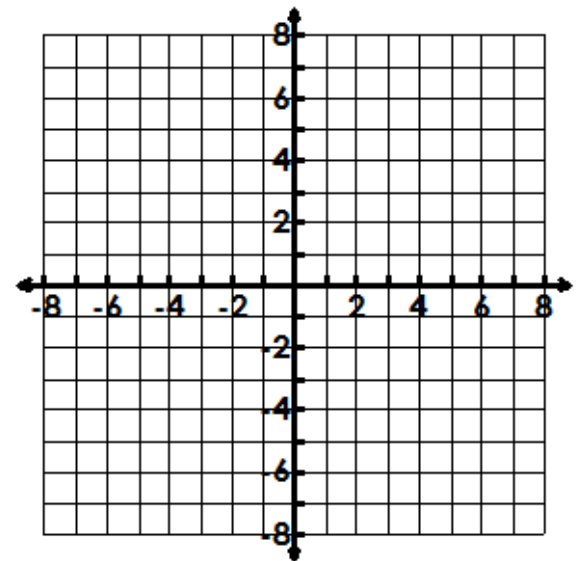
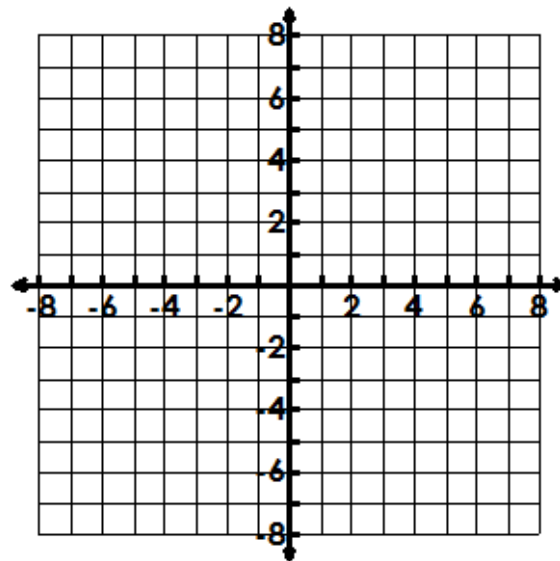
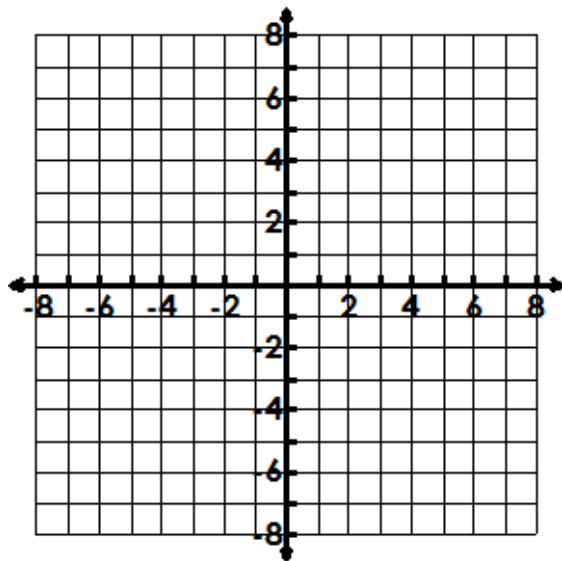
x	-3	-2	-1	0	1	2	3
y							

b. $y = x^2$

x	-3	-2	-1	0	1	2	3
y							

c. $y = 2^x$

x	-3	-2	-1	0	1	2	3
y							



Type: _____

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Type: _____

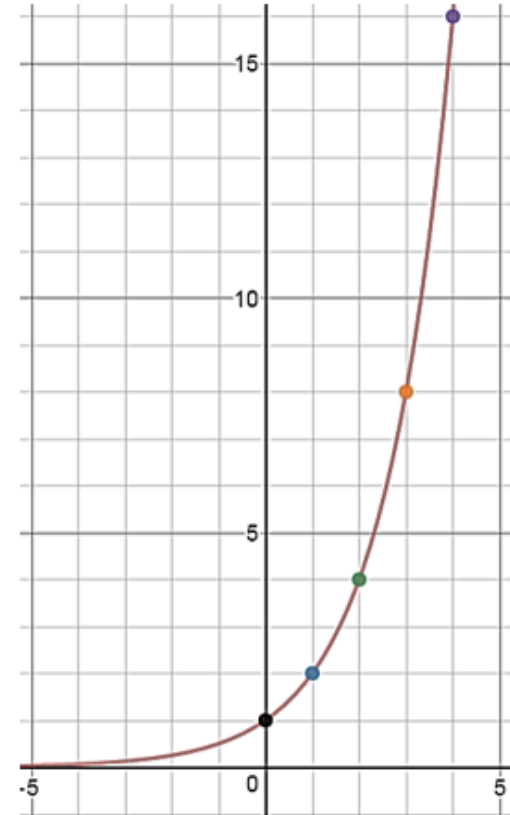
How is Equation C different from Equations A and B (you have already learned about equations A & B).

EXPONENTIAL FUNCTIONS

Exponential Functions

$$y = ab^x$$

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

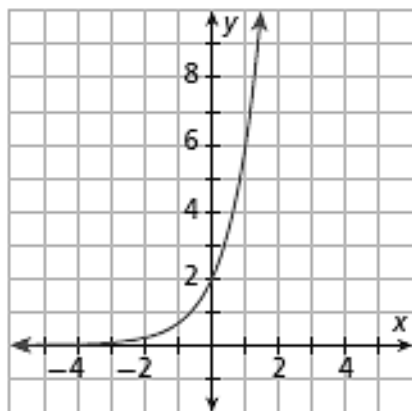


ASYMPTOTES

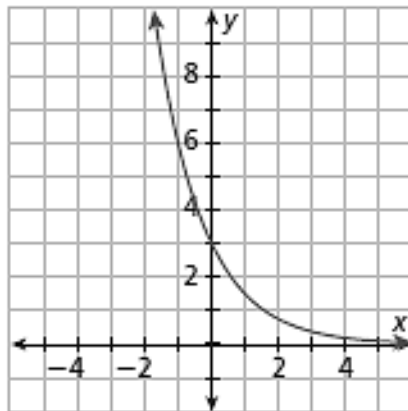
An **asymptote** is a line that an exponential graph gets closer and closer to but never touches or crosses. The **equation for the line of an asymptote for a function in the form of $f(x) = ab^x$** is always $y = \underline{\hspace{2cm}}$.

Identify the asymptote of each graph.

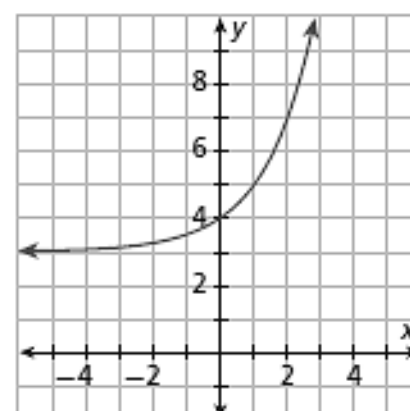
a.



b.

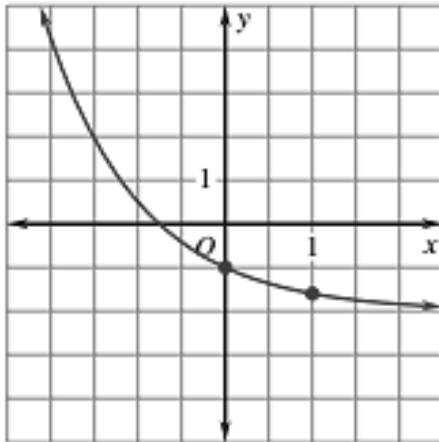


c.

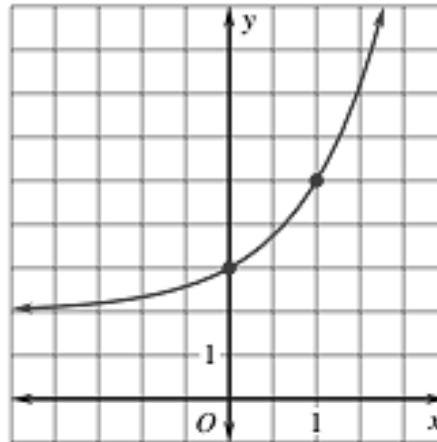


ASYMPTOTES

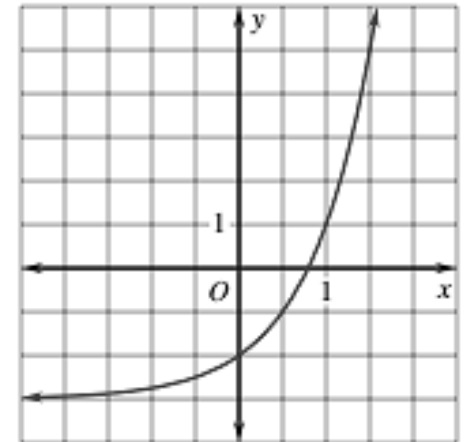
d.



e.



f.



EVALUATING FUNCTIONS

- When graphing exponential functions, it is important that you understand how to evaluate an exponential function.
- Since the variable is in the exponent, you will evaluate the function differently than you did with a linear function. You will still substitute the value of x into the function, but will be taking that value as a power.

Example 1: Evaluate each exponential function.

a. $f(x) = 2(3)^x$ when $x = 5$

b. $y = 8(0.75)^x$ when $x = 3$

c. $f(x) = 4^x$, find $f(2)$.

GENERAL FORM

The general form of an exponential function is:

$$y = ab^x$$

Where **a** represents your starting or initial value/population and y-intercept
b represents your growth/decay factor

GRAPHING EXPONENTIAL FUNCTIONS

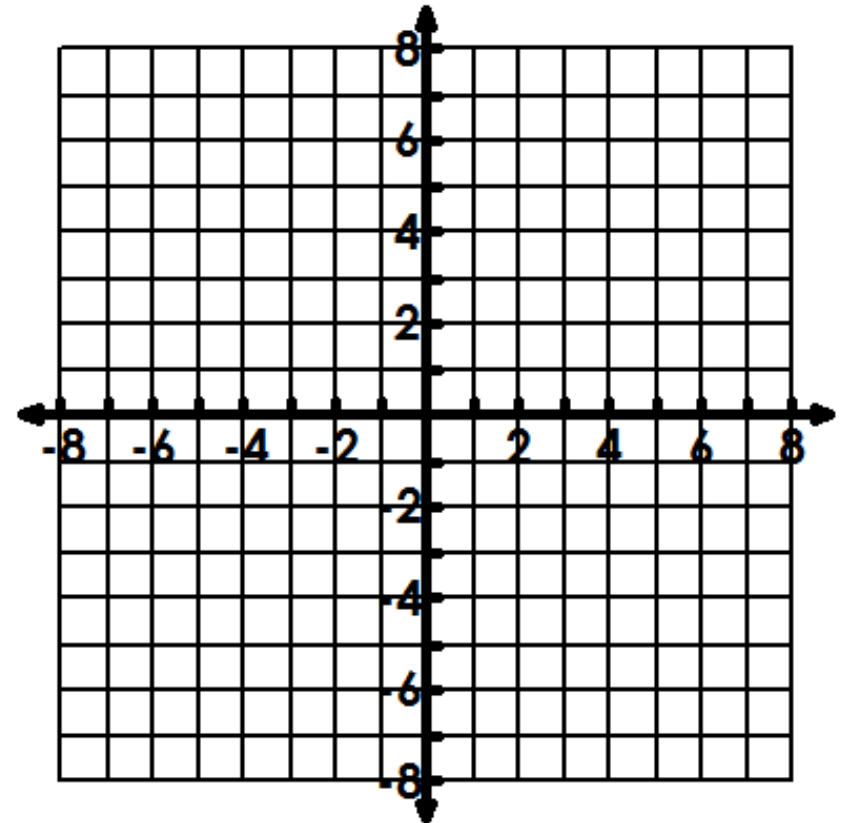
Graphing Exponential Functions Steps

1. Create an x-y chart with 5 values for x (Safest values for x: -2, -1, 0, 1, 2).
2. Substitute those values into the function and record the y or $f(x)$ values.
3. Graph each ordered pair on a graph.

EXAMPLE 1

Graph the following:

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



Y-intercept:

Asymptote

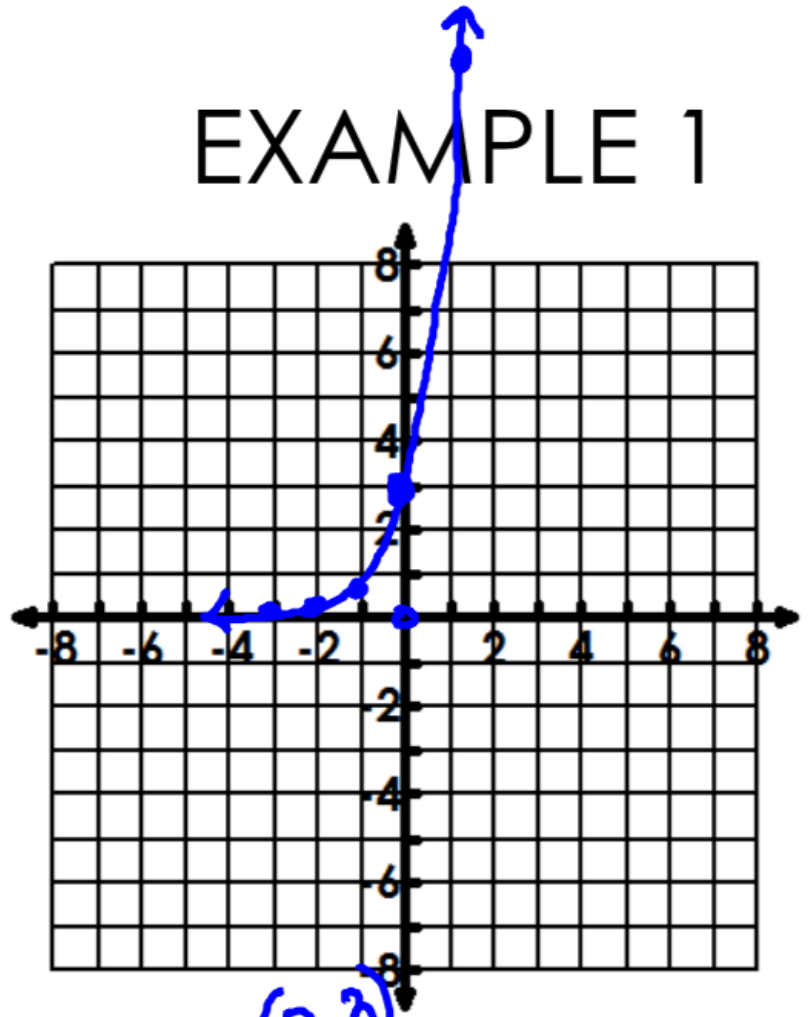
EXAMPLE 1

Graph the following:

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

X	Y
-3	.05
-2	.1875
-1	.75
0	3
1	12
2	48

Handwritten notes: Red arrows point from the y-values to the next higher y-value, labeled "x4". The cell containing (0, 3) is boxed in blue.



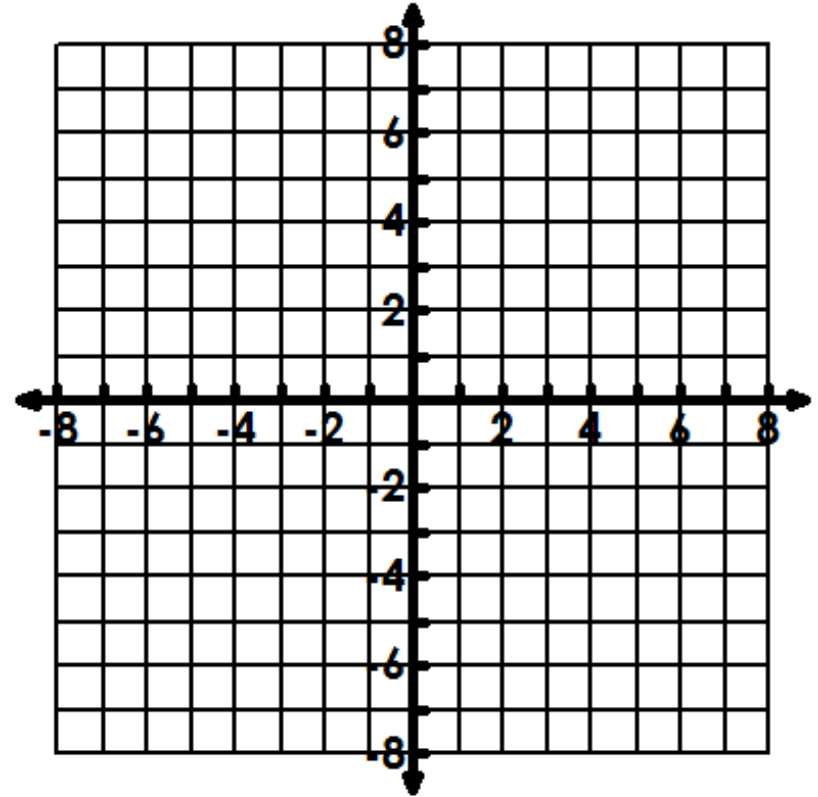
Y-intercept: (0, 3)

Asymptote
 $y=0$

EXAMPLE 2

Graph the following:

b. $f(x) = 2^x$



Y-intercept:

Asymptote:

$$y = ab^x$$

Graph the following:

b. $f(x) = 2^x$

$$f(x) = \frac{1}{a} b^x$$

X	y
-3	.125
-2	.25
-1	.5
0	1
1	2
2	4
3	8

Y-int \rightarrow 0

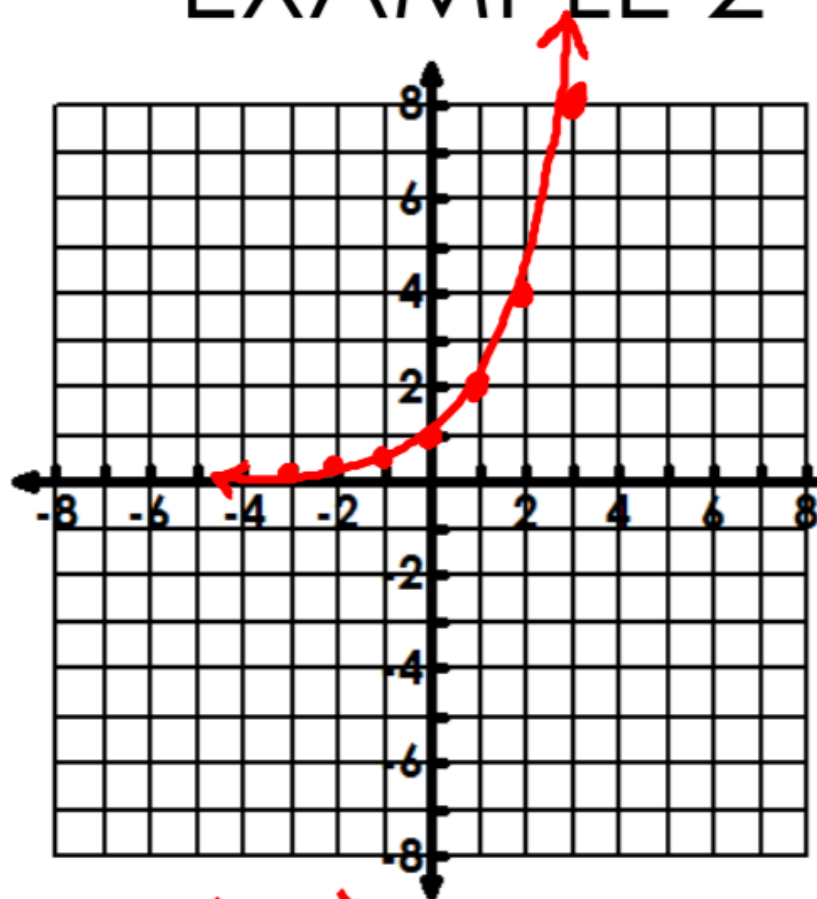
$\times 2$

$\times 2$

$\times 2$

$\times 2$

EXAMPLE 2



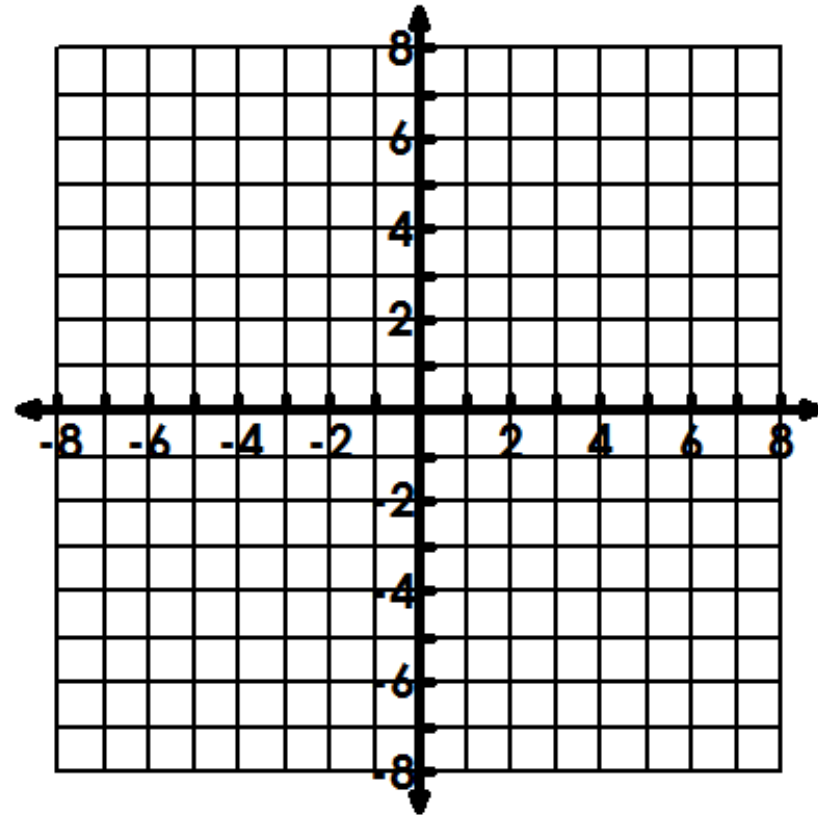
Y-intercept: $(0, 1)$

Asymptote:
 $y = 0$

EXAMPLE 3

Graph the following:

c. $y = 3\left(\frac{1}{2}\right)^x$



Y-intercept:

Asymptote:

EXAMPLE 3

Graph the following:

c. $y = 3\left(\frac{1}{2}\right)^x$

a $\frac{1}{2}$ *b*

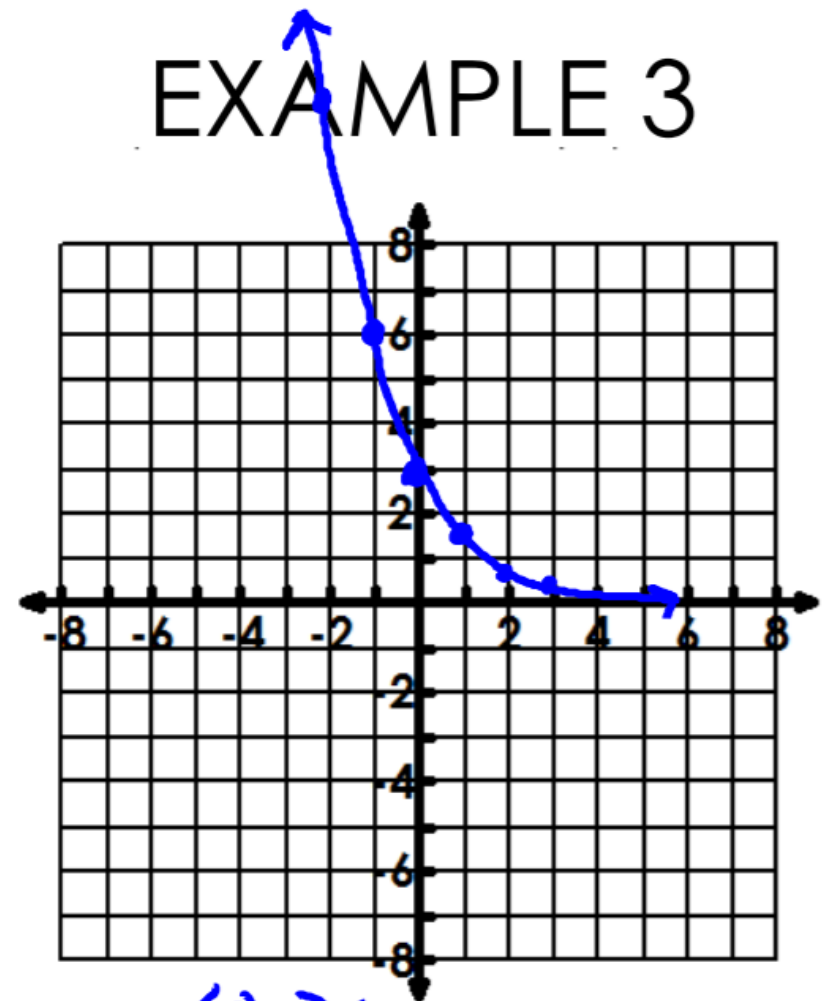
x	y
-2	12
-1	6
0	3
1	1.5
2	.75
3	.375

y-int $(0, 3)$

$\times \frac{1}{2}$

$\times \frac{1}{2}$

$\times \frac{1}{2}$



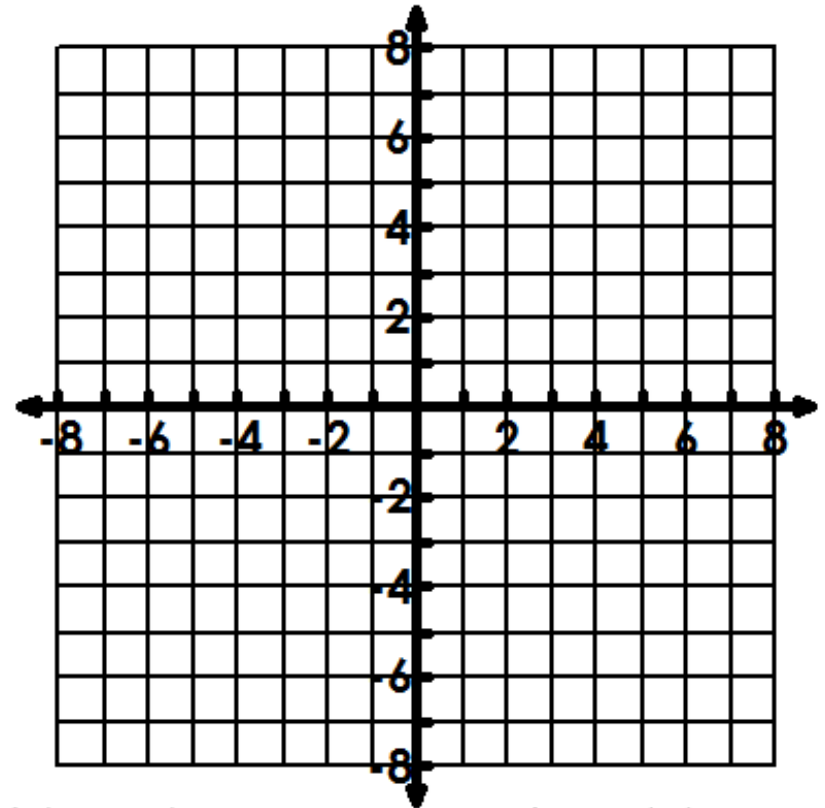
Y-intercept: $(0, 3)$

Asymptote: $y=0$

EXAMPLE 4

Graph the following:

d. $f(x) = 4(.25)^x$



Y-intercept:

Asymptote:

THE Y-INTERCEPT

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. _____

b. _____

SUMMARY

Equation	'a' values	'b' values	General Shape of Graph
$y = 3(4)^x$ $f(x) = 2^x$			
$y = 3\left(\frac{1}{2}\right)^x$ $f(x) = 4(.25)^x$			

IDENTIFYING GROWTH/DECAY

a. $y = 4\left(\frac{3}{4}\right)^x$

b. $y = -2(3)^x$

c. $y = \frac{1}{2}(1.4)^x$

d. $y = (0.9)^x$

e. $y = 3\left(\frac{5}{2}\right)^x$