Recall:
Given the sequences below, determine whether they are arithmetic or geometric, find the next three terms, and write an equation and NEXT/NOW statement.

Ex.) 2, 5, 8, 11,...
Arithmetic or Geometric

Next three terms: 14, 17, 20

Explicit: $a_n = 3(n-1)+2$

Recursive: $a_n = a_{n-1} + 3$

linear

Ex. 7, -14, 28, -56,....
Arithmetic or Geometric

Next three terms: 112, -224, 448

Explict: $a_n = 7 \cdot (-2)^{n-1}$

Recursive: $a_n = a_{n-1} \cdot -2$

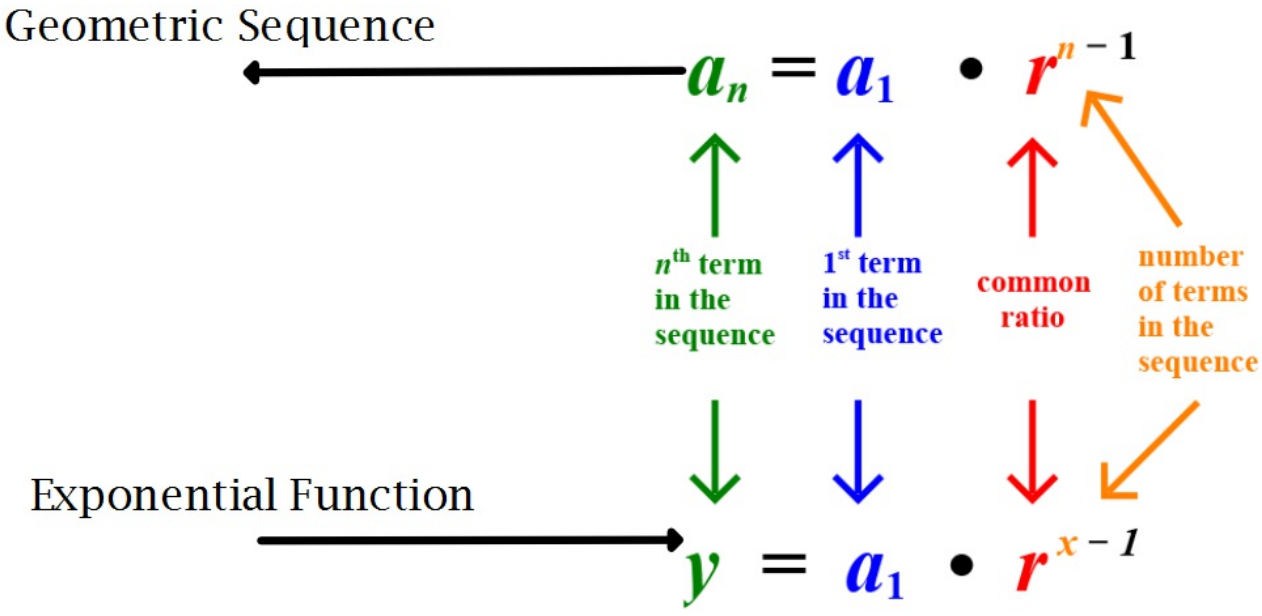
Intro to Exponential Functions

An exponential function is a form of a geometric sequence.

A function in which the variable is the exponent is called an **exponential function**.

$$y = a \cdot b^x$$

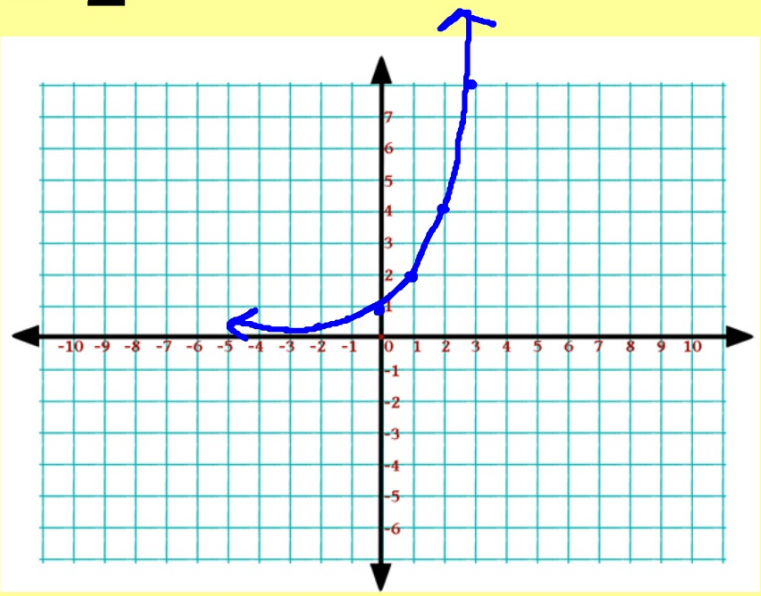
a = y-intercept (when there is no shift)
b = common ratio, base



Make a graph using a table

$$y = 2^x$$

x		y
-2	2^{-2}	1/4
-1	2^{-1}	1/2
0	2^0	1
1	2^1	2
2	2^2	4



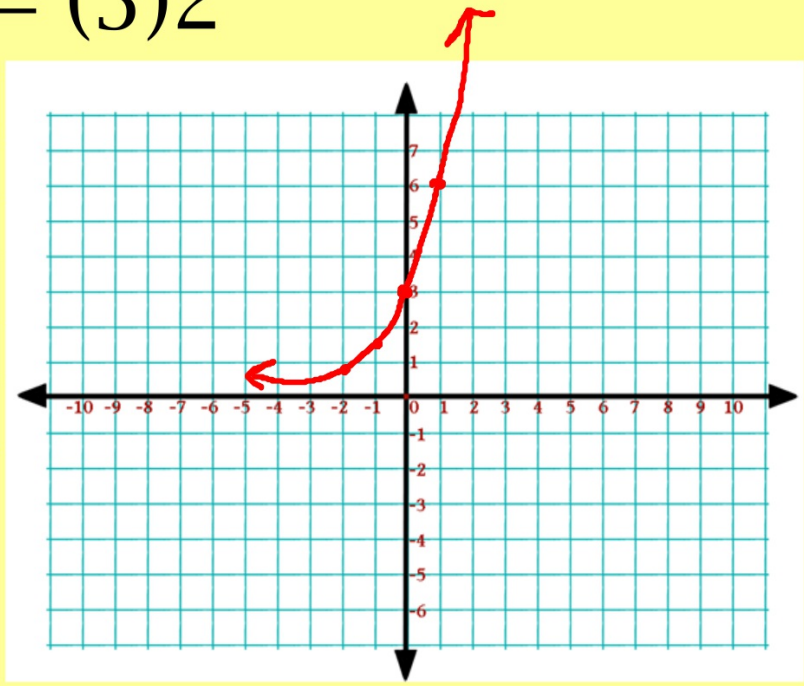
y-int: 1

base: 2

Make a graph using a table

$$y = (3)2^x$$

x		y
-2	$3(2)^{-2}$	$3/4$
-1	$3(2)^{-1}$	$3/2$
0	$3(2)^{0}$	3
1	$3(2)^{1}$	6
2	$3(2)^{2}$	12



y-int: 3

base: 2

Turn and Talk

What did you notice about the graphs of exponential functions?

- not lines
-

How would you describe the increase?

the y-values increased quicker

(1 - 2 min)

Find the y-intercept of the exponential functions.

A.) $y = 3(.75)^x$

$(0, 3)$

C.) $y = 2(1.05)^x - 4$

$(0, -2)$

B.) $y = 0.5(1.04)^x$

$(0, 0.5)$

D.) $y = .80^x - 3$

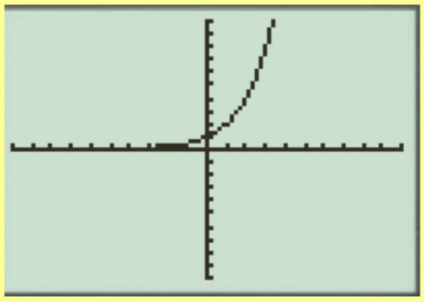
$(0, -2)$

Hint: Exercises C and D have shifts.
Y-intercept is value of y when x =0

What does it mean when an exponential function has a shift?

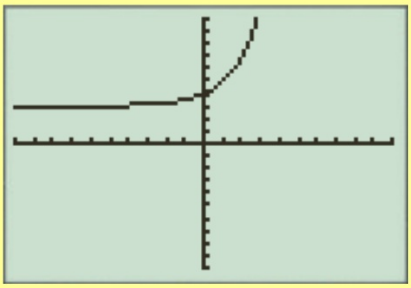
An exponential function in the form $f(x)= a(b^x) + k$ has a vertical shift.

The constant, k, is what causes the shift to occur.



$y = 2^x$

(0,1)



$y = 2^x+3$

(0,4)

*Notice the y-intercepts.

Ex.) The function $f(x) = 3(2)^x$ was replaced with f(x) + k so that the y-intercept became (0,5). What is the value of k?

a = 3, b =2

y - int: (0,3)

$3 + K = 5$

$K = 2$

Ex.) The function $f(x) = -4(3)^x$ was replaced with f(x) + k so that the y-intercpet became (0,3). What is the value of k?

$-4 + K = 3$

$+4 \qquad +4$

$K = 7$

Ex.) The function $f(x) = 0.5(1.5)^x$ was replaced with $f(x) + k$, as graphed below. What is the value of k?

$0.5 + K = -2$

$K = -2.5$