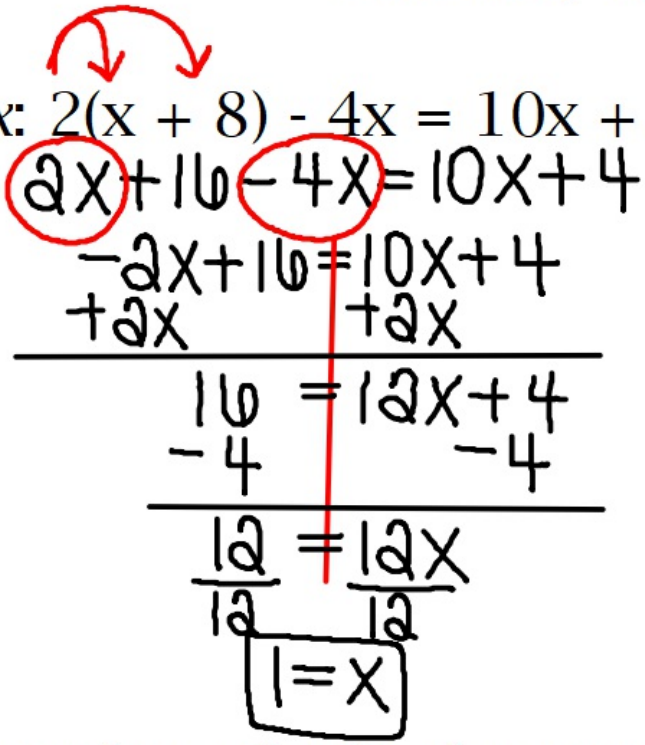
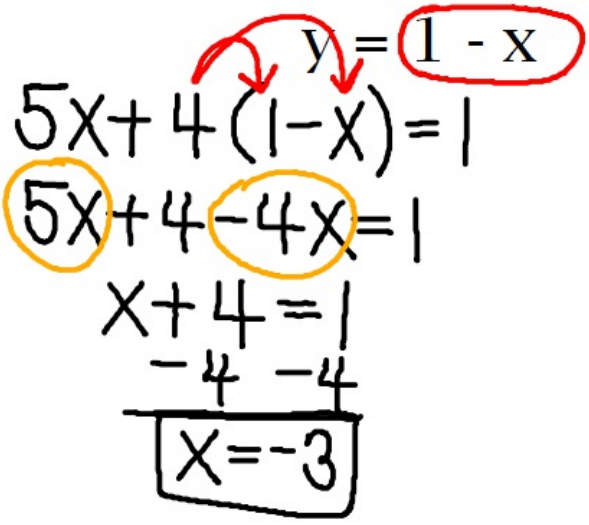
Warm Up February 5, 2019

1.) Solve for *x*: 2(x + 8) - 4x = 10x + 4



2.) What is the value of *x* in the system of equations shown below?

$$5x + 4y = 1$$



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.) Ex. 7, -14, 28, -56,....

Arithmetic or (Geometric) $r = -2$

Next three terms: $112, -224, 448$

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

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

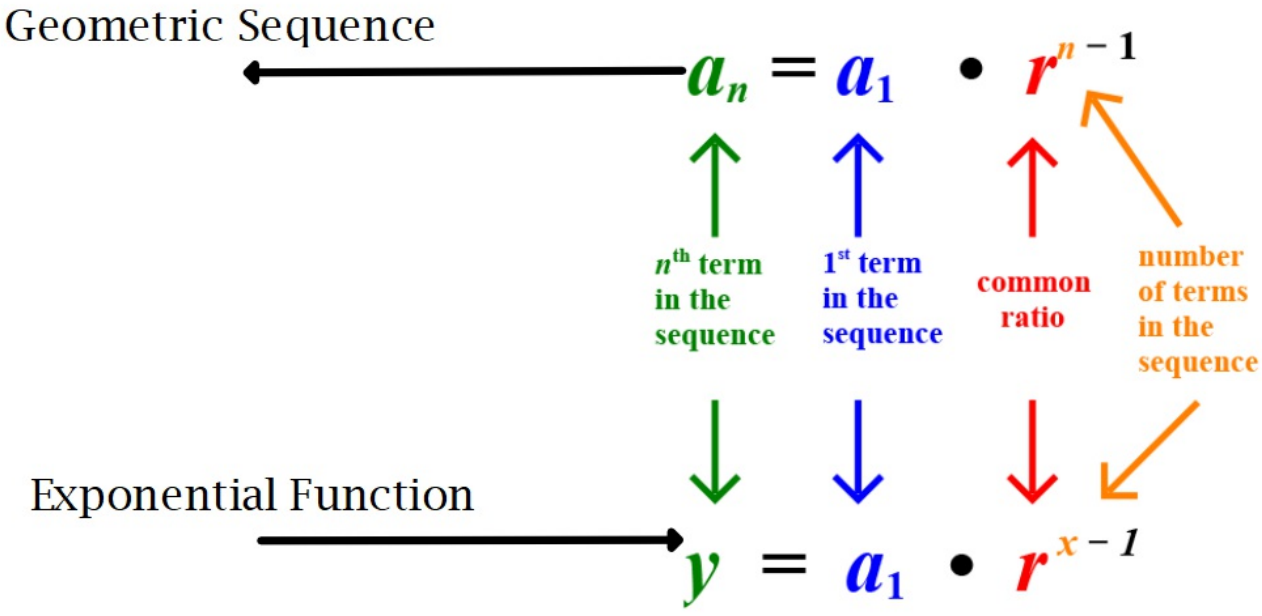
Intro to Exponential Functions

An exponential function is a form of a geometric sequence.

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

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

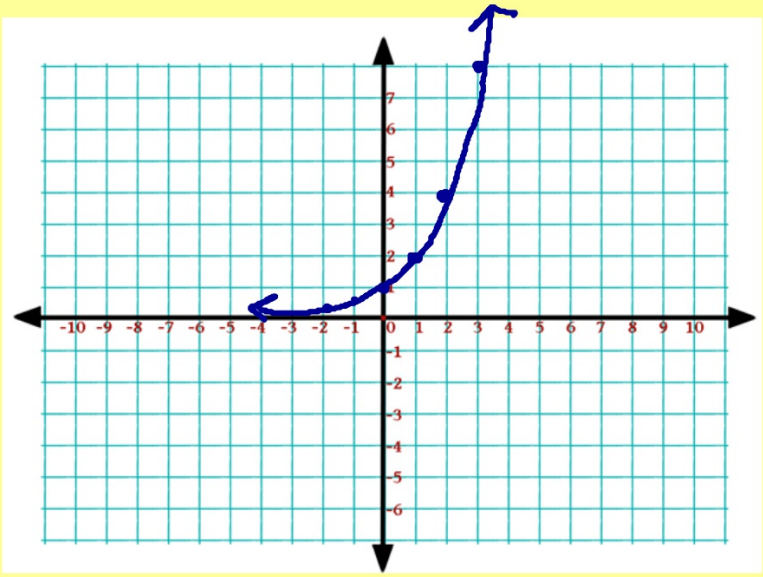
a = y-intercept (when there is no shift)
b = common ratio, base



Make a graph using a table

$y = 2^x \longrightarrow 1 \cdot 2^x$

x		y
-2	2^{-2}	.25
-1	2^{-1}	.5
0	2^0	1
1	2^1	2
2	2^2	4



y-int: (0,1)

base: 2

Make a graph using a table

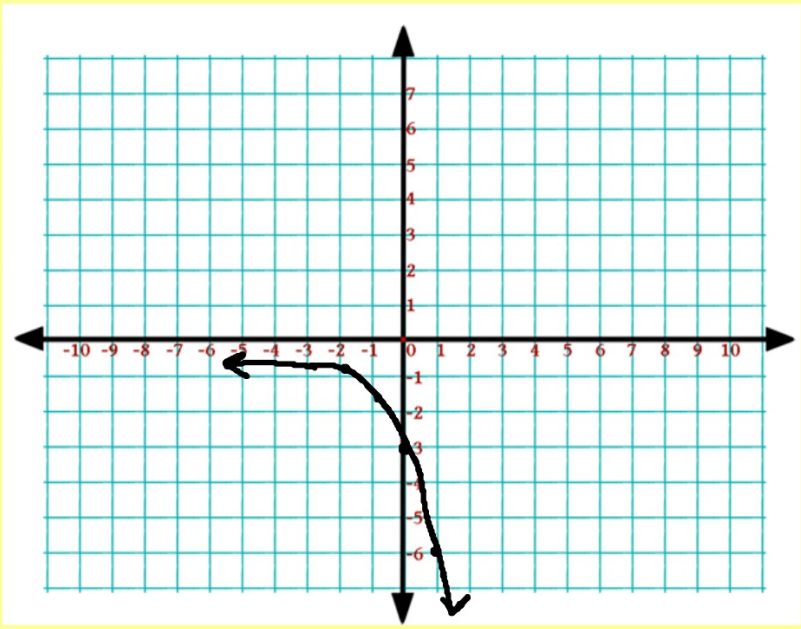
$$y = (-3)2^x$$

a b

x		y
-2	$-3(2)^{-2}$	-.75
-1	$-3(2)^{-1}$	-1.5
0	$-3(2)^{0}$	-3
1	$-3(2)^{1}$	-6
2	$-3(2)^{2}$	-12

y-int: (0, -3)

base: 2



Turn and Talk

What did you notice about the graphs of exponential functions?

How would you describe the increase?

(1 - 2 min)

Find the y-intercept of the exponential functions.

A.) $y = 3(.75)^x$ — a — $(0,3)$

C.) $y = 2(1.05)^x - 4$ — $(0,-2)$

B.) $y = 0.5(1.04)^x$ — a — $(0,0.5)$

D.) $y = .80^x - 3$ — $y = 1(.80)^x - 3$ — $(0,-2)$

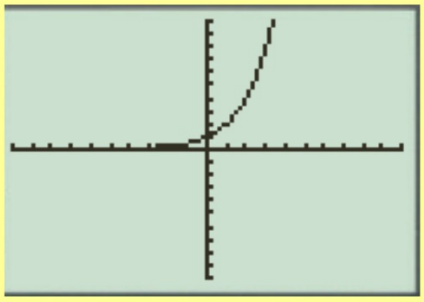
Hint: Exercises C and D have shifts.
Y-intercept is value of y when x =0

$y=4^x \longrightarrow$ Y-Intercept is (0,1).

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

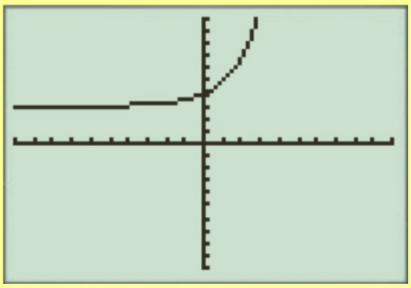
An exponential function in the form $f(x)= a(b^x) + k$ has a vertical shift.

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.

original

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?

vertical shift

a = 3, b =2

y - int: (0,3)

original + K = new

$-3 + K = 5$

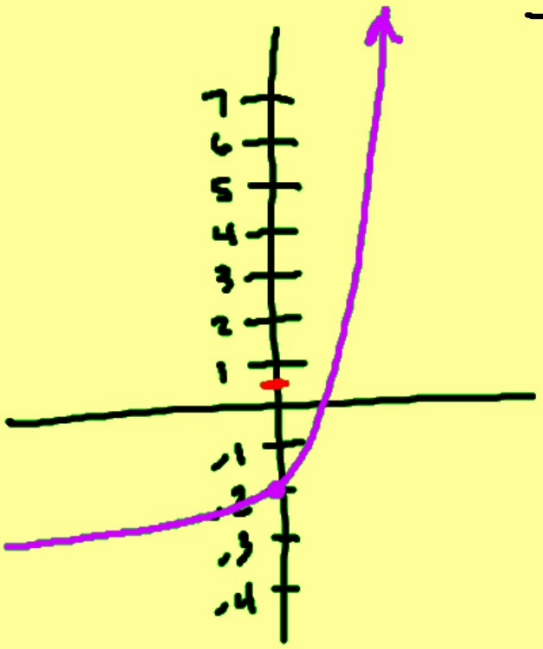
$-3 \quad -3$

$K = 2$

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?



$$0.5 + k = -2$$
$$-0.5 \quad -0.5$$
$$k = -2.5$$