Name _____

This packet is due at the end of the hour.

Summer Job

Let's apply this idea and compare exponential growth with linear growth.
Suppose you are going to work for your crazy aunt this summer helping her with her landscaping business. She believes that a flat hourly rate is just too boring.
She gives you two options for how you'd like to be paid. Your job of course is to decide which option will pay you more in the end.

Option 1: You will be paid $.01 for the first lawn you mow. For each one after that, your wage will double. So the second lawn will earn you 2¢, the third will earn you 4¢, and so on.

Option 2: You will be paid $10 for the first lawn you mow. For each one after that, your wage will increase by $6. So your second lawn will earn you $16, then $22 for the third, and so on.

To help you decide which option would be better, fill out a table for each option:

OPTION 1	x (lawn #)	1	2	3	4	5	6	7	8
	y (wage)								
OPTION 2	x (lawn #)	1	2	3	4	5	6	7	8
	y (wage)								

So far, which option seems like the better choice?

Now continue the table, and see if this still seems like the best option.

OPTION 1	x (lawn #)	9	10	11	12	13	14	15	16
	y (wage)								
OPTION 2	x (lawn #)	9	10	11	12	13	14	15	16
	y (wage)								

Let's make some conclusions.

a. Is either option *always* the better choice?

b. Option 2 is a better choice if you mow between _____ and _____ lawns. If you mow _____ or more lawns, Option 1 is a better choice.

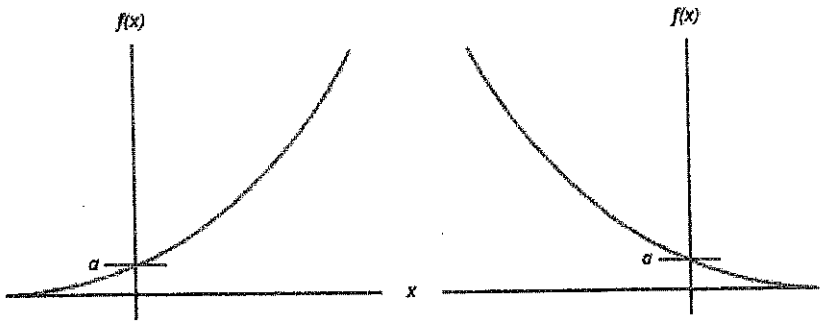
c. Which option demonstrates *linear* growth?

d. Which option demonstrates *exponential growth?*

6.5 Read and Try Notes:
Transformations of Exponential Functions

You should already know the basic shapes of exponential growth and decay:

Today you'll practice graphing these same basic shapes with *transformations*, meaning they will also be moved up, down, right, left, or reflected.



(a) Exponential growth $f(x) = ab^x$ with $b > 1$

(b) Exponential decay $f(x) = ab^x$ with $0 < b < 1$

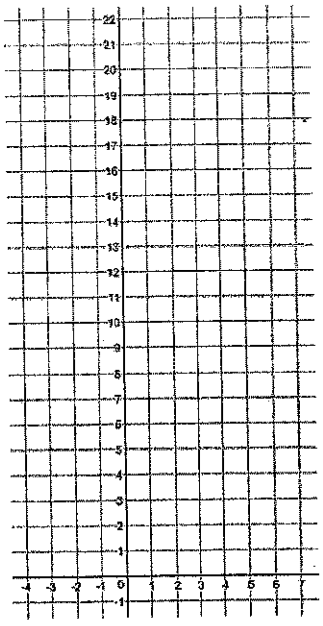
Graph each function by first filling out the table. Then complete the statement to make the conclusion.

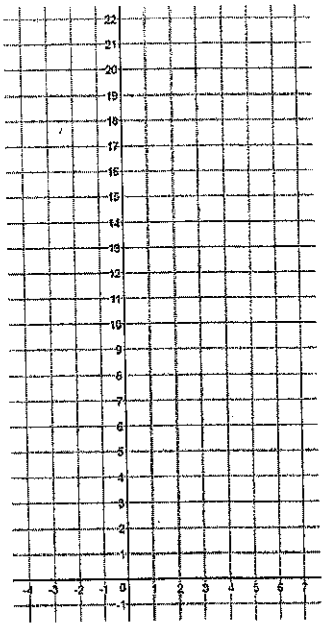
1. $y = 2 \cdot 3^x$
2. $y = 2 \cdot 3^x + 4$
3. $y = 2 \cdot 3^x - 5$

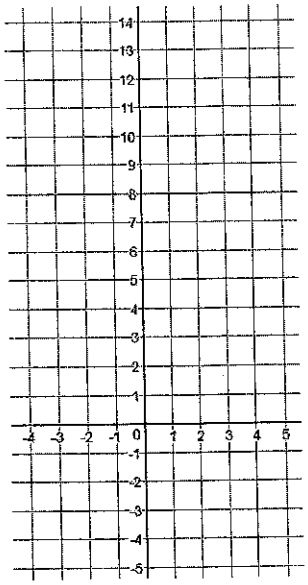
x	$y = 2 \cdot 3^x$
0	
1	
2	

x	$y = 2 \cdot 3^x + 4$
0	
1	
2	

x	$y = 2 \cdot 3^x - 5$
0	
1	
2	







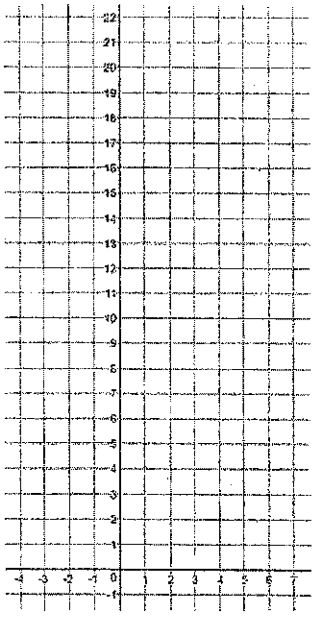
Now make a conclusion! Let $y = a \cdot b^x$ be the original ("parent") function.

$y = a \cdot b^x + C$ moves the equation _____ C units.

$y = a \cdot b^x - C$ moves the equation _____ C units.

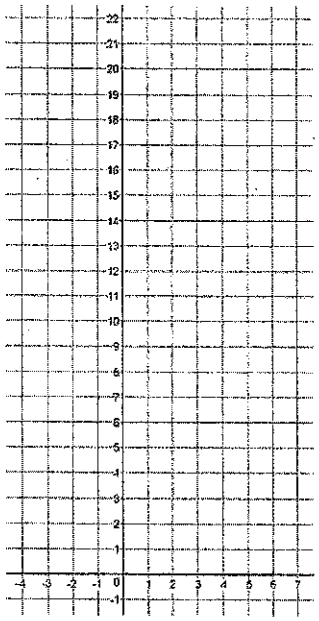
4. $y = 2 \cdot 3^x$

x	$y = 2 \cdot 3^x$
0	
1	
2	



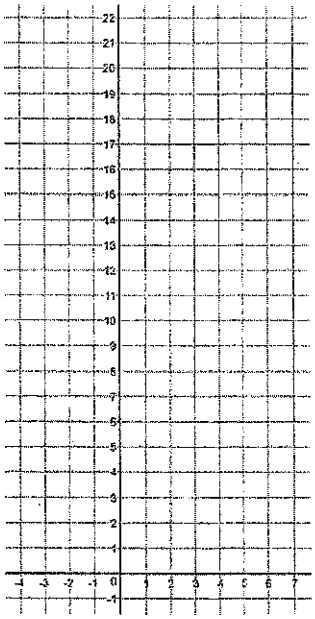
5. $y = 2 \cdot 3^{x-3}$

x	$y = 2 \cdot 3^{x-3}$
1	
2	
3	
4	



6. $y = 2 \cdot 3^{x+3}$

x	$y = 2 \cdot 3^{x+3}$
-4	
-3	
-2	
-1	



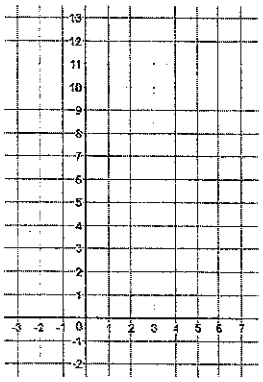
Now make a conclusion! Let $y = a \cdot b^x$ be the original ("parent") function.

$y = a \cdot b^{x-C}$ moves the equation _____ C units.

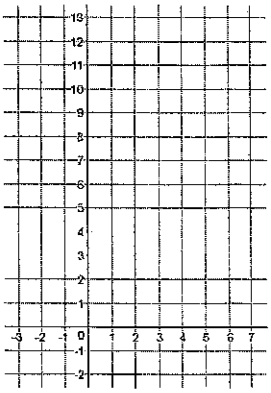
$y = a \cdot b^{x+C}$ moves the equation _____ C units.

Based on these rules, sketch the following equations. Be sure to include the horizontal asymptote!

7. $y = 8\left(\frac{1}{2}\right)^x + 3$



8. $y = 8\left(\frac{1}{2}\right)^{x-4}$



How to find an exponential equation from 2 points

Read these ex's carefully + then try the probs to the right

The General Form of an Exponential Function is $y = a \cdot b^x$

Ex 1) Find the exponential Function which contains the points (0, 3) and (1, 12).

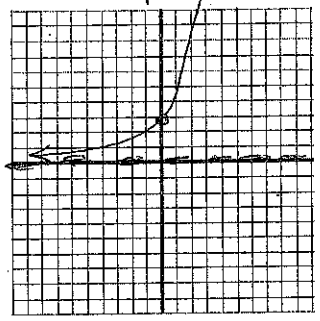
0	3
1	12

y-int → 3 ; ×4

initial value = 3

growth factor is 4

$y = 3 \cdot 4^x$



Ex 2) Find the exponential Function which contains the points (0, 4) and (1, 2).

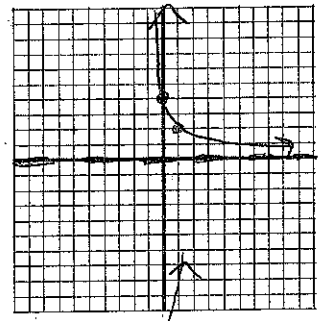
y	
0	4
1	2

y-int → 4 ; ×$\frac{1}{2}$

initial value = 4

decay factor = $\frac{1}{2}$

$y = 4\left(\frac{1}{2}\right)^x$



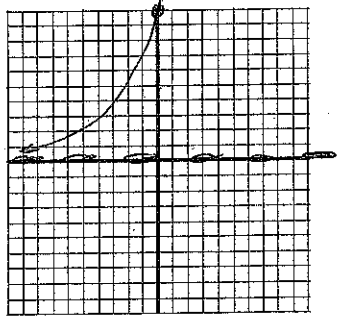
Ex 3) Find the exponential function which contains the points (0, 10) and (1,15).

0	10
1	15

y-int → 10 ; ×1.5

initial value = 10

growth factor = 1.5



$10x = 15$

$x = 1.5$

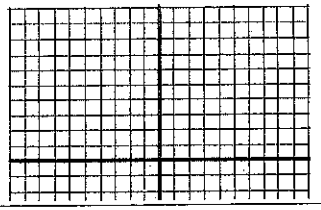
HOMEWORK

Use 2 points (either given or from a graph) to create exponential equations.

1. (0, 1) (1, 5)

Graph:

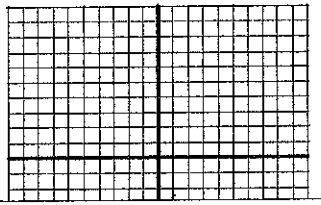
Write the equation:



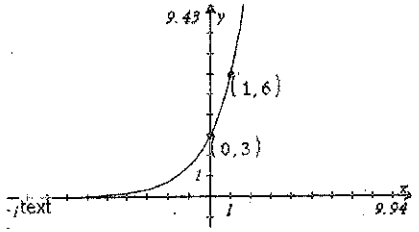
2. (0,12) (1, 6)

Graph:

Write the equation:



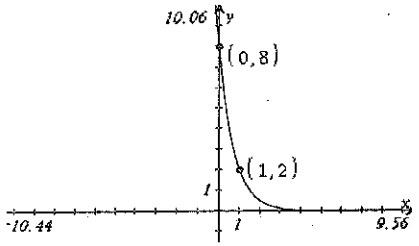
3.



Is it exponential growth or decay?

Write the equation:

4.



Is it exponential growth or decay?

Write the equation