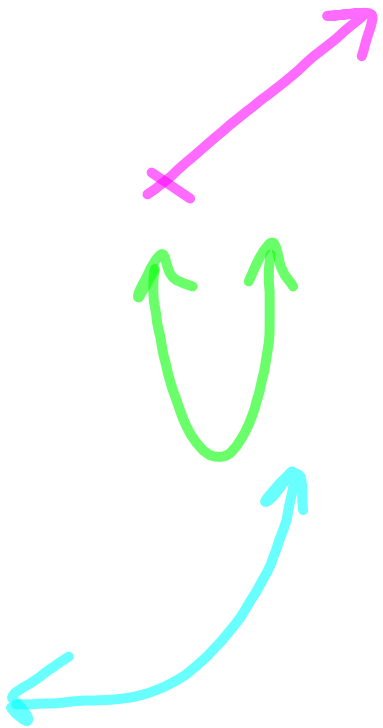


$y = mx^{1} + b$ Linear

$y = ax^{2} + bx + c$

$y = a(x-h)^{2} + k$

$y = ab^{x}$

Day 2 - Graphing Exponential Functions

The general form of an exponential function is:

$$y = ab^x$$

· y-int · start amt · Base · growth or decay

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

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.

Graph the following:

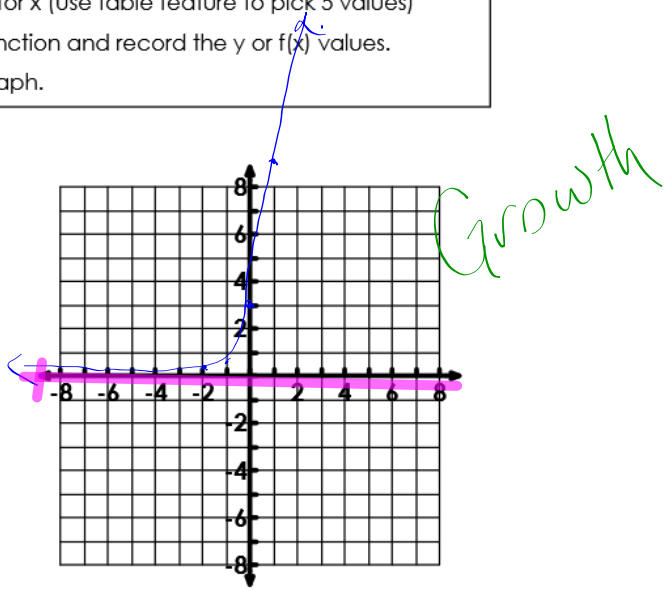
a. $y = 3(4)^x$

x	y
-2	.19
-1	.75
0	3
1	12
2	48

×4 ×4

Y-intercept: (0, 3)

Asymptote: y = 0



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

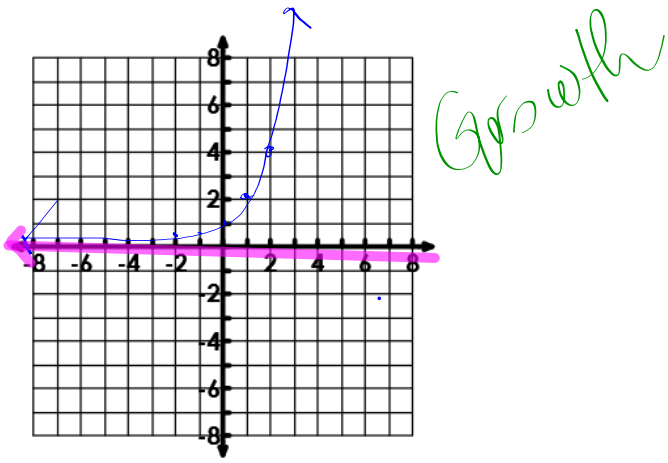
Rewrite: $y = 1(2)^x$

x	y
-2	0.25
-1	.5
0	1
1	2
2	4

×2 ×2

Y-intercept: (0, 1)

Asymptote: y = 0



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Algebra 1 Unit 10: Exponential Functions Notes

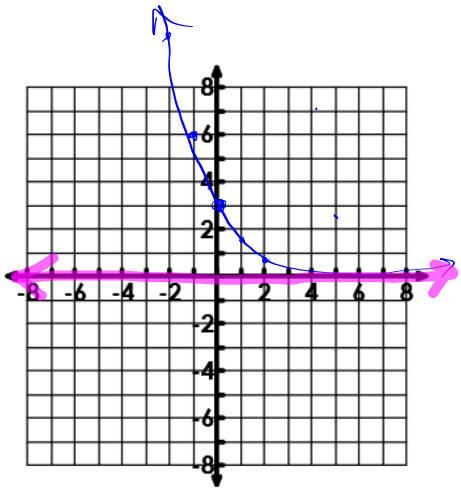
c. $y = 3\left(\frac{1}{2}\right)^x$

multiply 1/2

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

Y-intercept: (0, 3)

Asymptote: y = 0

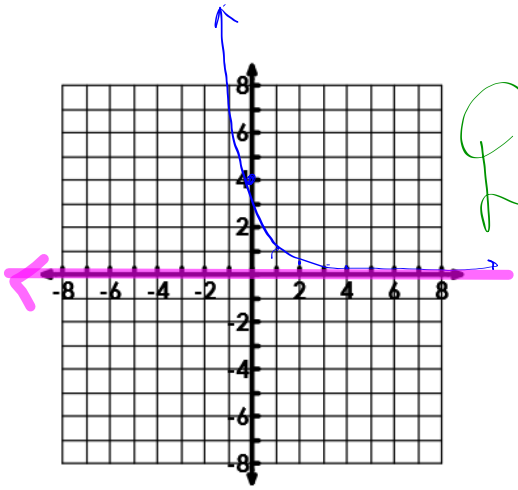


d. $f(x) = 4(.25)^x$

x	y
-2	64
-1	16
0	4
1	1
2	.25

Y-intercept: (0, 4)

Asymptote: y = 0



Decay

$y = ab^x$

Think about it:...

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

y-intercept is our a-value

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

a. look at a-value (with no transformations)

b. Graphing Calc: Y= type in function + look for x @ 0 (in table)

Old Fashion: Substitute 0 in for x & find y.

Way

$y = ab^x$

Algebra 1 Unit 10: Exponential Functions Notes

Summary of Different Types of Exponential Graphs

Equation	'a' values	'b' values	General Shape of Graph
$y = 3(4)^x$	$a = 3$	$b = 4$	Growth • b is > 1 • increasing quickly
$f(x) = 2^x$ $f(x) = 1(2)^x$	$a = 1$	$b = 2$	
$y = 3\left(\frac{1}{2}\right)^x$	$a = 3$	$b = \frac{1}{2}$	Decay • b is between 0 & 1 ($0 < b < 1$) • decreasing quickly
$f(x) = 4(.25)^x$	$a = 4$ (y-int)	$b = .25$	

Determine if the following equations represent growth or decay. Then explain why.

a. $y = 4(\frac{3}{4})^x$ b. $y = -2(3)^x$ c. $y = \frac{1}{2}(1.4)^x$ d. $y = 3(\frac{5}{2})^x$

Decay: $b = \frac{3}{4}$ Growth: $b = 3$ G: $b = 1.4$ G: $b = \frac{5}{2}$

Creating Exponential Functions from Tables and Graphs

The general form of an exponential function is **$y = ab^x$**. You've learned what *a* and *b* represent. The *a* value represents the y-intercept or starting amount and the *b* value represents the constant ratio or growth/decay factor. Therefore, you can think of the general form of an exponential function as the following:

y = y-intercept(constant ratio)^x

$y = ab^x$

Using this new idea of thinking about what the equation of an exponential function means, see if you can create an exponential function for each of the tables below:

a.

x	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{2}$	2	8	32	128

$y = 2(4)^x$

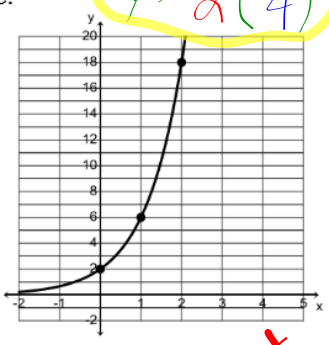
b.

x	-2	-1	0	1	2	3
y	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27

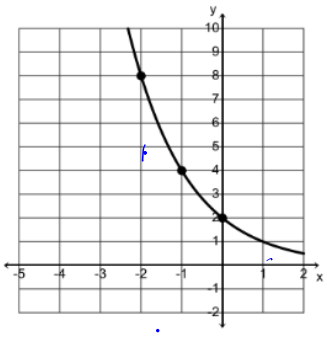
y-int; ×3, ×3

$y = 1(3)^x$ or $y = 3^x$

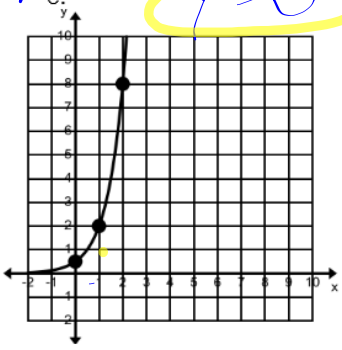
c.



d.



e.



x	y
0	2
1	6
2	18

y-int; ×3, ×3

$y = 2(3)^x$

x	y
-2	8
-1	4
0	2
1	1

y-int; ×½, ×½

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

$y = .5(4)^x$

$y = ab^x$

$a = 2$ = y-int

$b = 3$

$y = 2(3)^x$

x	y	
0	2	← y-int.
1	6	×3
2	18	×3
3	54	×3
4	162	