Learning Goal 10.1: Exponential Functions

After completion of this unit, you will be able to…

Learning Target #1: Graphs and Transformations of Exponential Functions

- Evaluate an exponential function
- Graph an exponential function using a xy chart
- Create an exponential function from a table or graph
- Transform an exponential function by translating, stretching/shrinking, and reflecting
- Identfiy transformations from a function
- Identify domain, range, intercepts, zeros, end behavior, extrema, asymptotes, and intervals of increase/decrease
- Calculate the average rate of change for a specified interval from an equation or graph
- Create exponential models and use them to solve problems

Timeline for Unit 10

Monday	Tuesday	Wednesday	Thursday	Friday
9 *Day 1/2* Intro to Exponentials & Graphing and Writing Equatinons of Exponentials	**10** *Day 2/3* Transformations of Exponentials	**11** **Early Release** Finish Day 3 & Practice Day	**12** *Day 4* Characteristics of Exponential Functions	**13** *Day 5* Applications of Exponential Functions
16 Day 6 Application Practice	**17** *Day 7* Review Day	**18** *Day 8* **Unit 10 Test**		

	Monday	Tuesday	Wednesday	Thursday	Friday
AM	Mrs. Jackson 7:45 – 8:15 Room 1210	Mr. Phillips 7:45 – 8:15 Room 1206	Mrs. Jackson & Mr. Webb 7:45 – 8:15 Room 1210 Room 1205	Mr. Watson & Mr. Phillips 7:45 – 8:15 Room 1208 Room 1206	Mr. Watson 7:45 – 8:15 Room 1208
PM	NONE	Mrs. Petersen 3:30 – 4:30 Room 1210	NONE	NONE	NONE

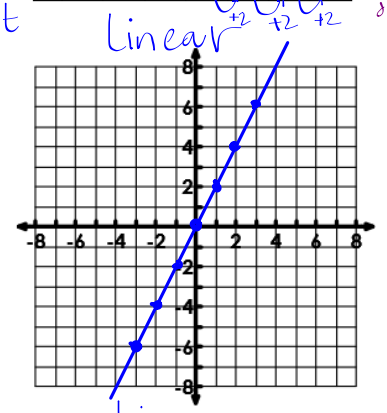
Algebra 1 Unit 10: Exponential Functions Notes

Day 1 – Intro to Exponential Functions

Exploring with Graphs: Graph the following equations:

a. $y = 2x$

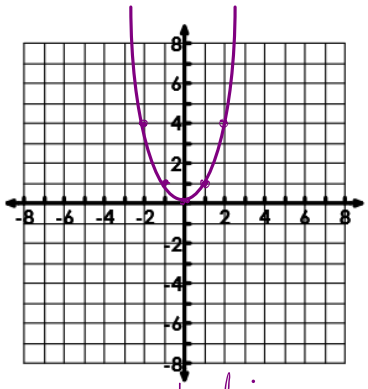
x	-3	-2	-1	0	1	2	3
y	-6	-4	-2	0	2	4	6



Type: Linear

b. $y = x^2$

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

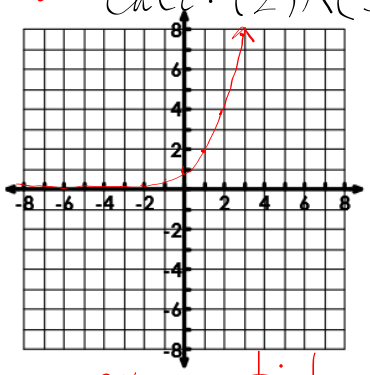


Type: quadratic

c. $y = 2^x$

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

Calc: (2)^(-3)



Type: exponential

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

- multiply by the same # (constant) ratio
- VARIABLE is in the exponent

Evaluating Exponential 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 that 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 $x = 5$

$f(5) = 2(3)^5$

$2(3)\wedge 5 = 486$

type into calc

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

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

$f(2) = 4^2$

$f(2) = 16$

Algebra 1 Unit 10: Exponential Functions Notes

Exploring with a Scenario:
Which of the options below will make you the most money after 15 days?

a. Earning $100 a day? 100x

x	1	2	3	4	5	6	7	8	9	10
y	$100	200	300	400	500	600	700	800	900	1000

+100

x	11	12	13	14	15	16	17	18	19	20
y	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000

b. Earning a penny at the end of the first day, earning two pennies at the end of the second day, earning 4 pennies at the end of the third day, earning 8 pennies at the end of the fourth day, and so on?

EXPONENTIAL 2^x

x	1	2	3	4	5	6	7	8	9	10
y	.01	.02	.04	.08	.16	.32	0.64	1.28	2.56	5.12

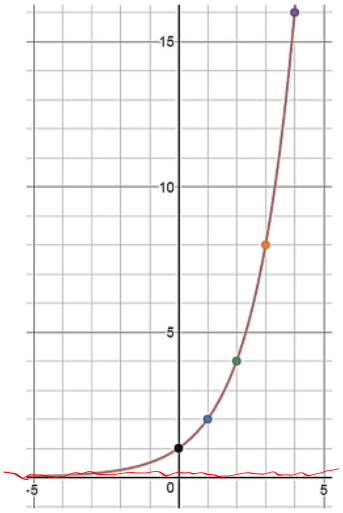
×2 ×2 ×2 ×2 ×2 ×2 ×2

x	11	12	13	14	15	16	17	18	19	20
y	10.24	20.48	40.96	81.92	163.84	327.68	655.36	1310.72	2621.44	5242.88

×2 ×2 ×2 ×2 ×2

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) HOT LAVA "flat line"
4. Constant Ratios (multiply by same number every time)



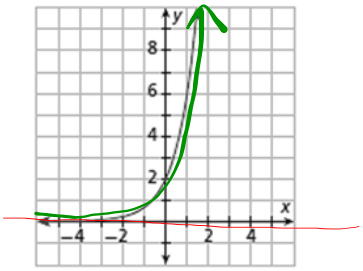
y = 0

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 = _____.**

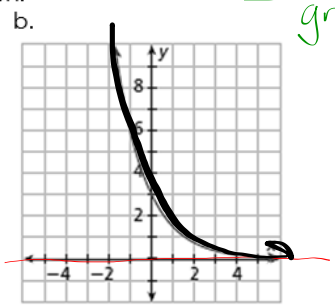
Identify the asymptote of each graph.

a.



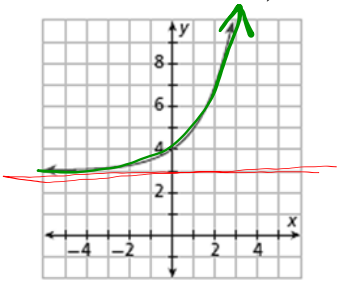
y = 0

b. growth



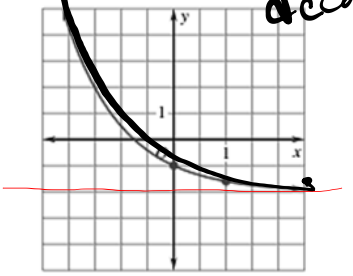
y = 0

c. decay



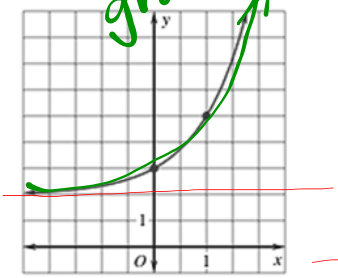
y = 3

d. decay



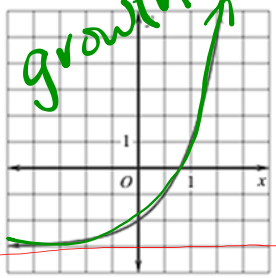
y = −2

e. growth



y = 2

f. growth



y = −3