

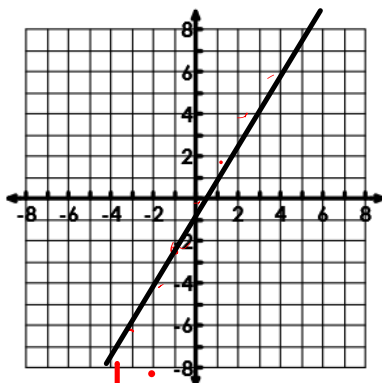
# Unit 7: Exponential Functions

## Day 1 – Graphing Exponential Functions

Exploring with Graphs: Graph the following equations:

a.  $y = 2x$

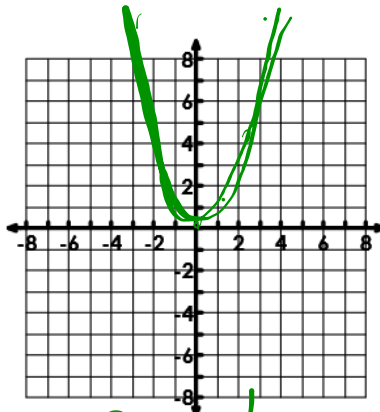
|   |    |    |    |   |   |   |   |
|---|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | -6 | -4 | -2 | 0 | 2 | 4 | 6 |



Type: linear

b.  $y = x^2$

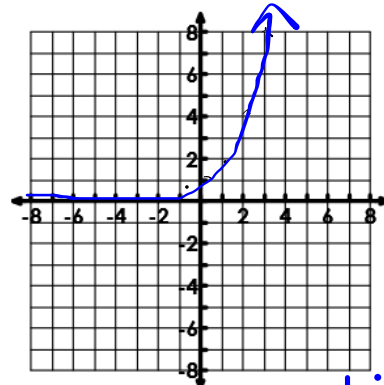
|   |    |    |    |   |   |   |   |
|---|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | 9  | 4  | 1  | 0 | 1 | 4 | 9 |



Type: quadratic

c.  $y = 2^x$

|   |       |      |     |   |   |   |   |
|---|-------|------|-----|---|---|---|---|
| x | -3    | -2   | -1  | 0 | 1 | 2 | 3 |
| y | 0.125 | 0.25 | 0.5 | 1 | 2 | 4 | 8 |



Type: exponential

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

## Graphing Exponential Functions

The general form of an exponential function is:

$$y = ab^x$$

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.

Algebra 1  
Graph the following:  
a.  $y = 3(4)^x$

| x  | y    |
|----|------|
| -2 | .188 |
| -1 | .75  |
| 0  | 3    |
| 1  | 12   |
| 2  | 48   |

Y-intercept:

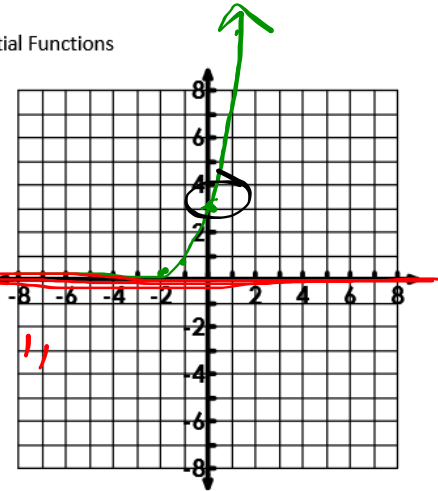
$(0, 3)$

Asymptote:

"flat line"  
 $y = 0$

Unit 7: Exponential Functions

Notes



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

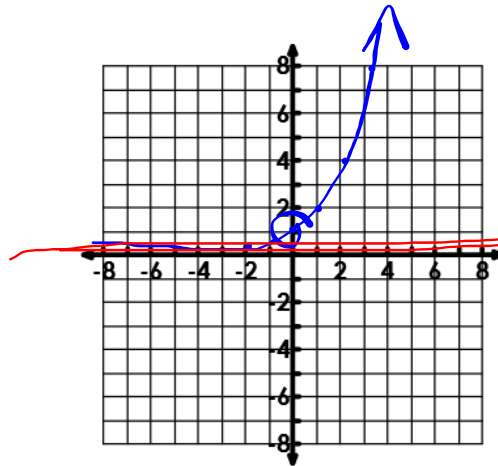
| x  | y   |
|----|-----|
| -2 | .25 |
| -1 | .5  |
| 0  | 1   |
| 1  | 2   |
| 2  | 4   |

Y-intercept:

$(0, 1)$

Asymptote:

$y = 0$



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

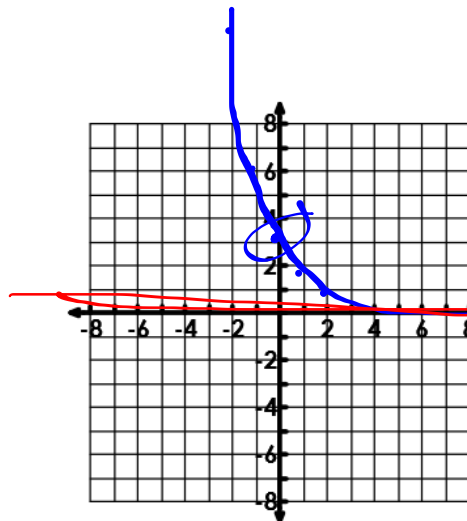
| x  | y    |
|----|------|
| -2 | 12   |
| -1 | 6    |
| 0  | 3    |
| 1  | 1.5  |
| 2  | 0.75 |

Y-intercept:

$(0, 3)$

Asymptote:

$y = 0$



Algebra 1

Unit 7: Exponential Functions

Notes

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

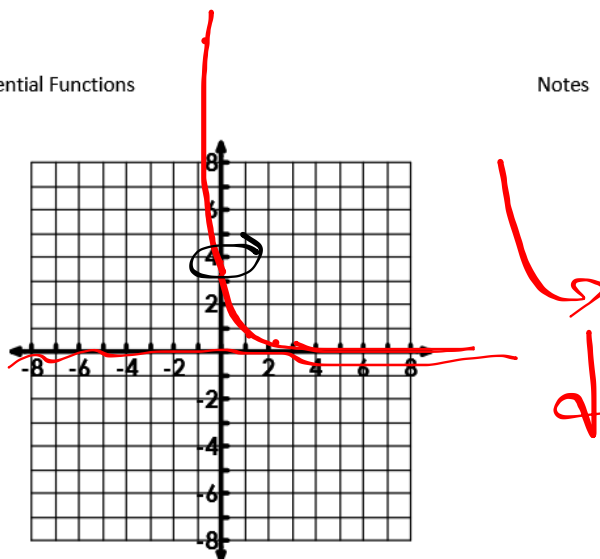
| x  | y   |
|----|-----|
| -2 | 64  |
| -1 | 16  |
| 0  | 4   |
| 1  | 1   |
| 2  | .25 |

Y-intercept:

$(0, 4)$

Asymptote:

$y = 0$



Think about it...

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

- $x = 0$  on table
- $x = 0$  in equation

$y = 3(4)^0$   
 $y = 3$   $(0, 3)$

Summary of Different Types of Exponential Graphs

| Equation                                    | 'a' values                  | 'b' values  | General Shape of Graph |
|---------------------------------------------|-----------------------------|-------------|------------------------|
| $y = 3(4)^x$<br>$f(x) = 2^x$                | $a = 3$<br>$a = 1$<br>y-int | $b > 1$     |                        |
| $y = 3(\frac{1}{2})^x$<br>$f(x) = 4(.25)^x$ | $a = 3$<br>$a = 4$<br>y-int | $0 < b < 1$ |                        |