Algebra RH

Essential Question: How do we identify and represent exponential functions? How do we graph exponential functions?

Do Now: A piece of paper is one layer thick. If we place another piece of paper on top of it, the stack is two layers thick. If we place another piece of paper on top, the stack is now three layers thick.

x *# of sheets added*	0	1	2	3
f(x) *# of layers of paper*	1	2	3	4

Is this relationship linear? If so, write an equation in function notation that describes the relationship.

What if we explored another relationship using a single piece of paper?

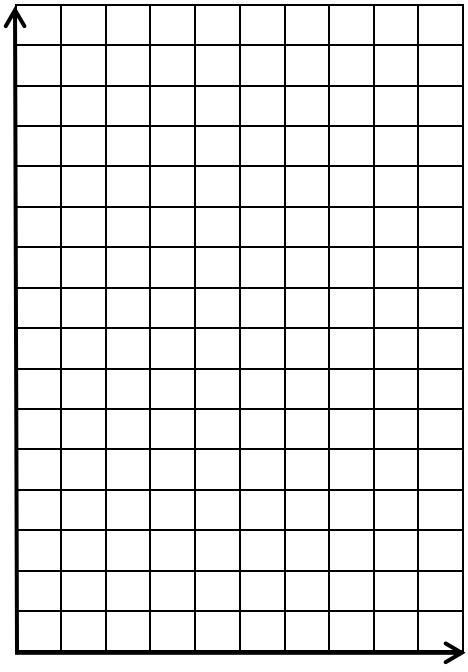
A piece of paper is one layer thick. If the paper is folded in half, the stack is 2 layers thick. If the stack is folded again, the stack is 4 layers thick. If the stack is folded a third time, it is 8 layers thick.

x *# of folds*	0	1	2	3	4
f(x) *# of layers of paper*	1	2	4	8	16

Is this relationship linear?

Is there a function that describes this relationship?

What does the graph of this relationship look like?



Exponential Function

$y = ab^x$ *or* $f(x) = ab^x$

In an exponential function, as the input values (x) increase by 1, the output values (y ***or*** **f(x)**) increase or decrease by a constant ratio, **b**. The ratio represented **b** is known as the **base**, the **multiplying factor** or "**growth factor**".

How do we graph exponential functions?

1) Create a table of values. *Suggested domain if not specified:* {-3, -2, -1, 0, 1, 2, 3}

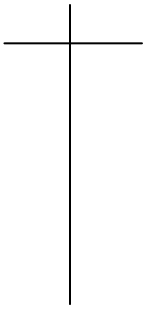
2) Plot the ordered pairs and create a curve. All ordered pairs are not necessary to plot to show the shape of the graph.

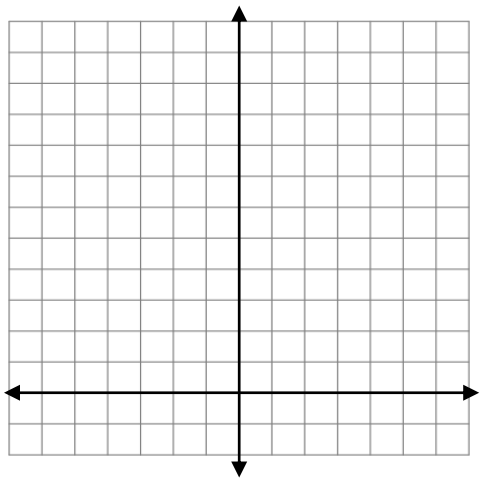
3) Label the graph with the equation (function).

Examples:

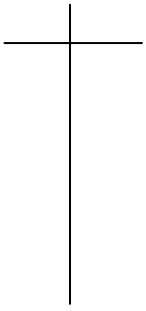
Graph the following exponential functions by creating a table of values.
For each function, identify the *y*-intercept and determine if the function is increasing or decreasing.

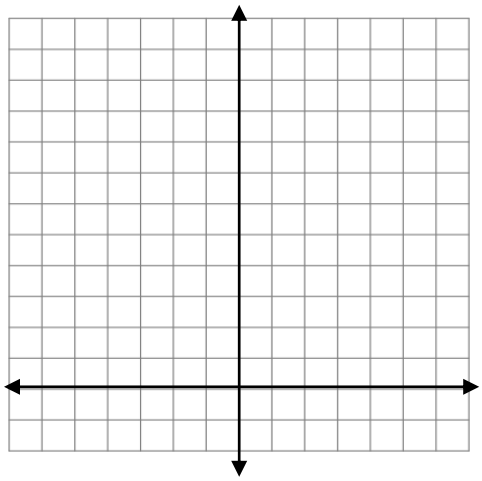
1. $y = 3^x$



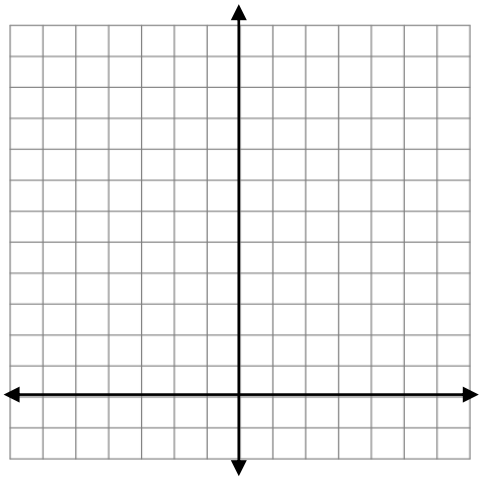


2. $y = \left(\frac{1}{3}\right)^x$

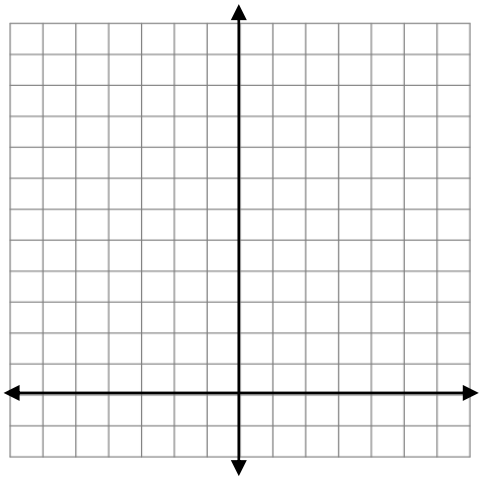




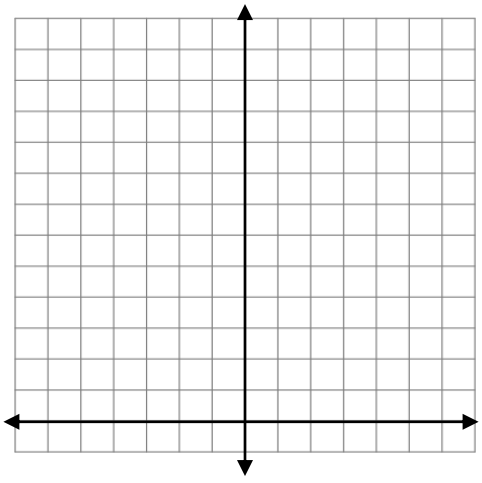
3. $y = 2\left(\frac{2}{3}\right)^x$



4. $y = \frac{1}{3}(3)^x$



5. Graph $f(x) = 3\left(\frac{1}{2}\right)^x$ for the given domain: $-2 \leq x \leq 2$



Using today's notes and graphs #1-5, complete the following table.

$y = ab^x$	a	b	y-intercept	increasing/decreasing
$y = 3^x$				
$y = \left(\frac{1}{3}\right)^x$				
$y = 2\left(\frac{2}{3}\right)^x$				
$y = \frac{1}{3}(3)^x$				
$f(x) = 3\left(\frac{1}{2}\right)^x$				

Fill in the blanks below based on the information from the table.

Exponential functions are represented by the equation $\mathbf{y = ab^x}$. *The graph of an exponential function is a curve.*

- $\mathbf{y = ab^x}$ *will increase if* _____.
- $\mathbf{y = ab^x}$ *will decrease if*_____.
- The **a** in $\mathbf{y = ab^x}$ *represents the* _____.