Title of Lesson: Exponential Functions and Their Graphs

By the end of this lesson, I will be able to answer the following questions…

1. How do I graph an exponential function using a shift method?
2. What is the natural base "e" value and how do I work with it?
3. What are the compound interest formulas and how do I use them?

Vocabulary

1. ***Compound Interest:*** "n" compounds per year

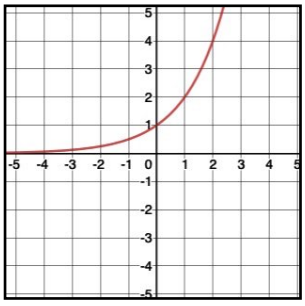
$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

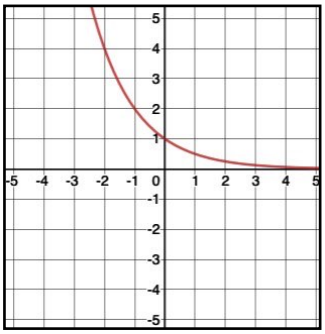
$A \rightarrow$ Amount
$P \rightarrow$ Principal
$r \rightarrow$ Rate in decimal form
$n \rightarrow$ Number of compounds per time period
$t \rightarrow$ Time period

2. ***Compound Interest:*** For continuous compounding

$A = Pe^{rt}$ where $e \approx 2.718$

3. Growth vs. Decay tendencies.





Prerequisite Skills with Practice

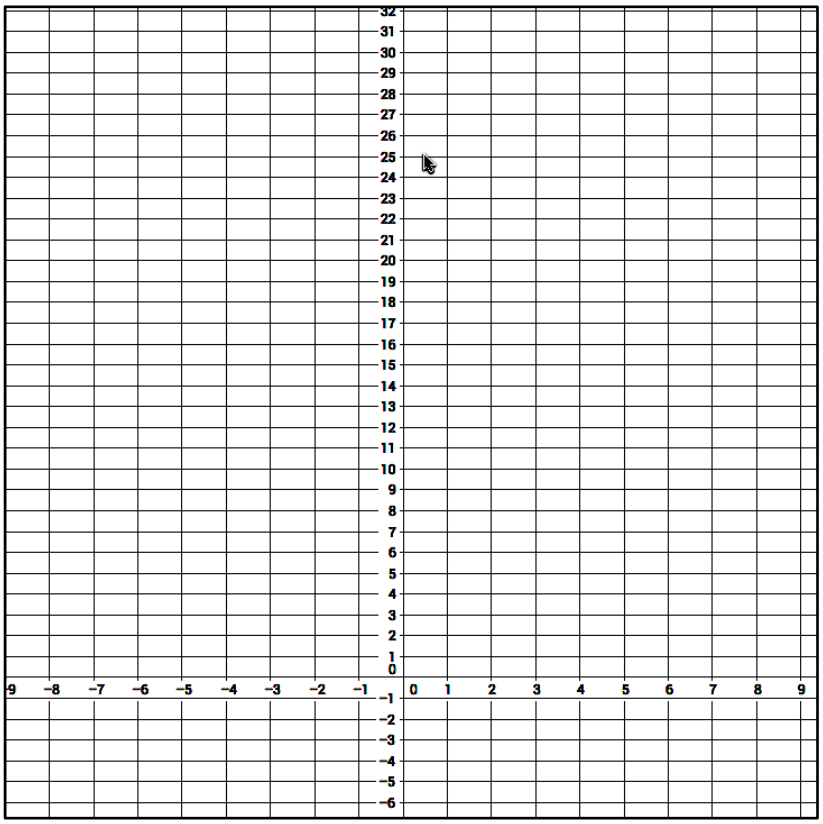
1. $a^x a^y \Leftrightarrow a^{x+y}$
2. $\frac{a^x}{a^y} \Leftrightarrow a^{x-y}$ $\quad 2x^3 \cdot 2x^5 \rightarrow$ $\quad \frac{10x^3}{15x^2} \rightarrow$
3. $(ab)^x \Leftrightarrow a^x b^x$
4. $(a^x)^y \Leftrightarrow a^{xy}$
5. $\left(\frac{a}{b}\right)^x \Leftrightarrow \frac{a^x}{b^x}$ $\quad \left(2xy\right)^3 \rightarrow$ $\quad \left(x^4\right)^3 \rightarrow$
6. $a^{-x} \Leftrightarrow \frac{1}{a^x}$
7. $a^0 = 1$ $\quad \left(x\right)^{-3} \rightarrow$ $\quad \left(\frac{y}{x}\right)^3 \rightarrow$

Graphing Exponential Functions

$f(x) = ab^{(x-h)} + k$

$f(x) = 3(2)^{(x-3)} - 4$

- *Parent:* _____
- *Multiplier:* _____
- *Shift:* _____
- *Asymptote:* _____
- *X - Intercept:* _____
- *Y- Intercept:* _____



x	2^x	y
1		
2		
3		
4		
5		
0		
-1		
-2		

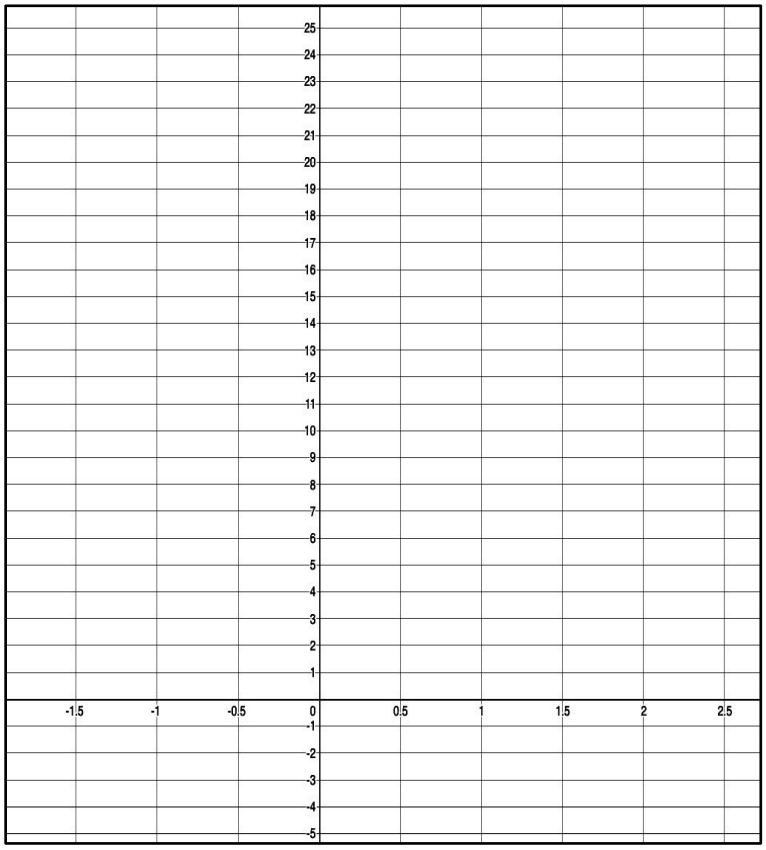
Graphing Exponential Functions

$$f(x)=ab^{(x-h)}+k$$

$$f(x)=-0.2(5)^{(x)}+10$$

- *Parent:* _____
- *Multiplier:* _____
- *Shift:* _____
- *Asymptote:* _____
- *X - Intercept:* _____
- *Y- Intercept:* _____

x	5^x	y
1		
2		
0		
-1		
-2		

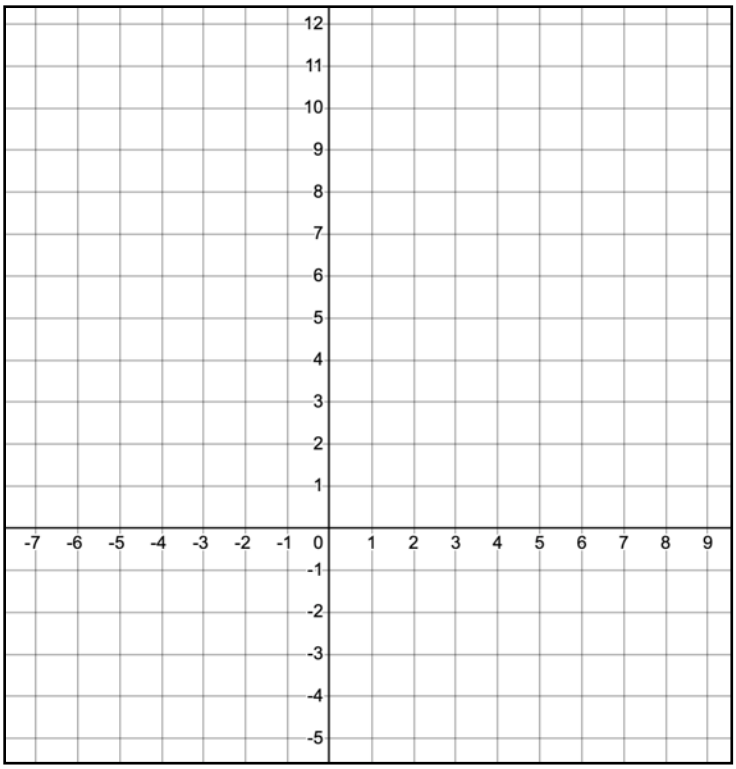


$$f(x)=ab^{(x-h)}+k$$

$$f(x)=2\left(\frac{1}{2}\right)^{(x+4)}-4$$

- *Parent:* _____
- *Multiplier:* _____
- *Shift:* _____
- *Asymptote:* _____
- *X - Intercept:* _____
- *Y- Intercept:* _____

x	$\left(\frac{1}{2}\right)^x$	y
1		
2		
0		
-1		
-2		



Compounding Per YEAR	$A = P\left(1+\frac{r}{n}\right)^{nt}$	AMOUNT AFTER ONE YEAR
Annually		
Bi-Annually		
Quarterly		
Monthly		
Weekly		
Daily		
Hourly		
Minutely		
Secondly		
Moment		

$A \rightarrow$ Amount

$P \rightarrow$ Principal

$r \rightarrow$ Rate in decimal form

$n \rightarrow$ Number of compounds per time period

$t \rightarrow$ Time period

You win 10,000 dollars and want to invest it in an account for 5 years. Which is the better deal?

$A = P\left(1+\frac{r}{n}\right)^{nt}$ Vs. $A = Pe^{rt}$

Bank A: offers 3.15 % Compounded Quarterly

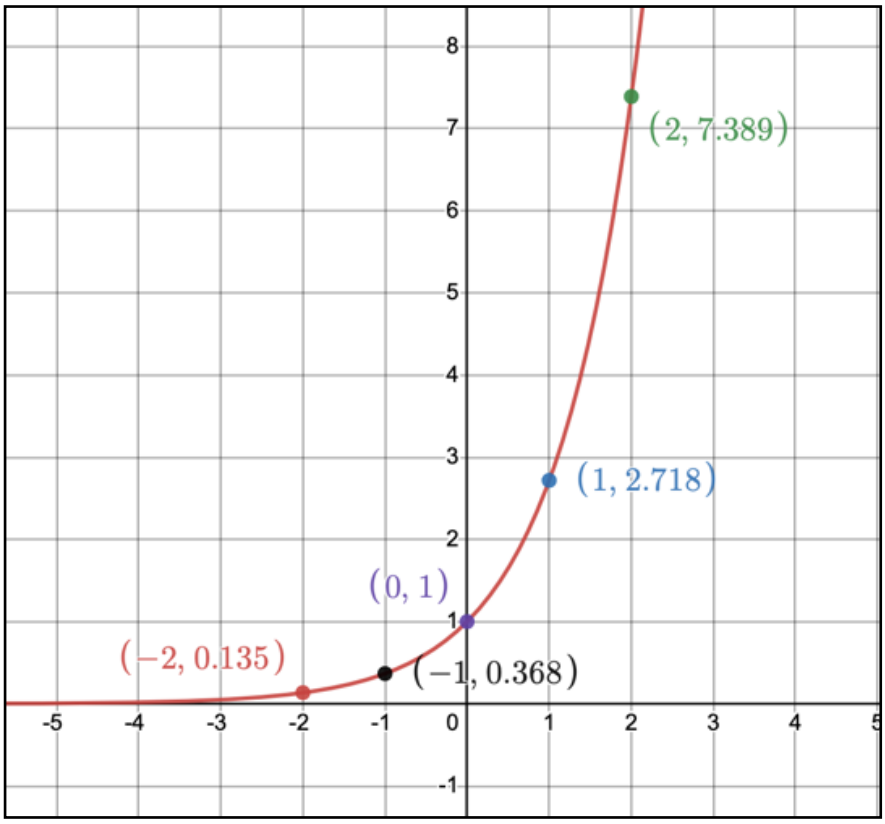
Bank B: offers 3.1 % Compounded Monthly.

Bank C: offers 3.0 % Compounded Continuously.

What bank do you choose?

$$f(x) = e^x$$

x	e^x	y
1		
2		
0		
-1		
-2		



$$f(x) = ab^{(x-h)} + k$$

$$f(x) = \frac{1}{2}e^{(x-3)} - 6$$

- *Parent:* _____
- *Multiplier:* _____
- *Shift:* _____
- *Asymptote:* _____
- *X - Intercept:* _____
- *Y- Intercept:* _____