STUDENT _____ GROUP _____

INSTRUCTOR _____ DATE _____

Math Lab Lesson #3 Classwork:

Compound Interest

WHAT TO DO:

- **Watch the video and take notes on this Classwork sheet**
- **Pause and repeat any parts of the video that you want to review again. It's not a race!**
- **Answer any questions embedded in the video**
- **After watching the video, complete the Practice Problems.**
- **Create one or two flashcards that relate to what you learned from the video and the Practice Problems.**
- **Then, go to the next video and repeat!**

★Video: Exponential Growth I (HW Help #4)

Simple Compound Interest Example

The general exponential model is

★ **Immediately after Bassourou buys a car, it begins to depreciate in value.**

The value of a car, V (in thousands of dollars), k years after you buy it is given by the function:

$$V(k) = 22(0.87)^k$$

a) What do the number 22 and 0.87 represent in this situation?

b) What will the value of the car be in 5 years?

★ **Write an equation to represent the following situation:**

You invest $\$9,000$ in the stock market and get a 7.25% annual rate of return. After 30 years, your stocks are worth K dollars.

Practice Problems: Exponential Growth I

1. **A steady investment**
   Imagine you invest $\$10{,}000$. The value of your investment increases by 3.5% every year (i.e., you make 3.5% annual interest).

   a) Write an equation showing the value of your investment, V, as a function of time, t, in years.

   b) How much would your investment be worth after 10 years?

   c) How much would your investment be work after 10 years if this interest was compounded monthly (12 times per year)?

   d) **How much more money** would you make if you interest was compounded monthly than if it was compounded annually?

2. **Aging superstar**

a) The number of points-per-game of an aging NBA star has decreased by 20% per year for three straight years. By what **total percent** has it decreased during this time?

b) In 2009, at the start of the player's decline, he scored 34.9 points-per-game. Find an equation showing the aging star's points-per-game, P, as a function the number of years, t, since 2009.

c) If this trend continues, how many point-per-game would this player average during the 2016 season?

STOP: DID YOU MAKE YOUR FLASHCARDS?

★Video: Exponential Growth II (HW Help #5)

Three Models of Exponential Growth

★**Example:** Drew has $500 to invest and is trying to decide between four banks that each offer a different rate of return. For each bank, write a formula for the total amount of money that Drew will have t years after she invests her money.

1. Grows at an annual rate of 12% per year

2. Grows at a rate of 12% per year, compounded quarterly

3. Grows at a continuous annual rate of 12% per year

4. Grows by $12 per year

Practice Problems: Exponential Growth II

1. **Tree Growth**

   Two Redwood trees are 75 feet tall and both grow continuously at an annual rate of 4.25%. Tree A grows for 35 years and then dies, and Tree B grows for twice as long and then dies.

   How much taller did Tree B get than Tree A?

2. a) A population of 3,300 bacteria **increases** by 40% continuously every week. Write the model that represents how many bacteria there are after **one week**?

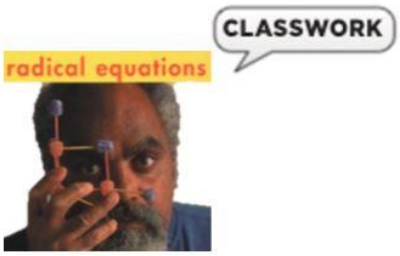
b) Another population of 3,300 bacteria **decreases** by 40% continuously every week. Write the model that represents how many bacteria there are after **three weeks**?

3. Match the description on the left with the mathematical model on the right.

NOTE: Three models cannot be matched.

Description	**Model**
I put $1,200 in a bank account that pays 1.25% annual interest, and left it there for 3 years	$1200(1+0.0125)^3$
	$1200(1+1.0125)^3$
A population of 1200 ants grows continuously at an annual rate of 1.25% over 3 years.	$1200e^{(0.0125)(5)}$
	$1200\left(1+\frac{1.25}{12}\right)^{(3)(12)}$
I put $1,200 in a bank account that pays 1.25% annual interest compounded monthly (twelve times every year), and left it there for 3 years	$1200e^{(1+0.0125)(3)}$
	$1200\left(1+\frac{0.0125}{12}\right)^{(3)(12)}$

STOP: DID YOU MAKE YOUR FLASHCARDS?



BOSS LEVEL

1. The graphs below show a $1000 deposit with 20% annual interest over four different compounding frequencies: annual, quarterly, monthly, and continuously. Which graph represent which compounding frequency? How do you know?