Exponential Functions

Thursday, January 19, 2012
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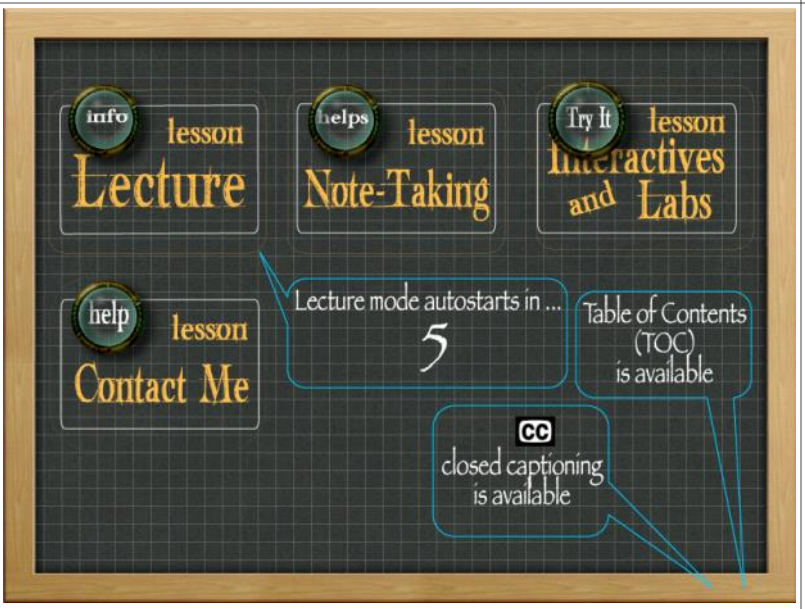
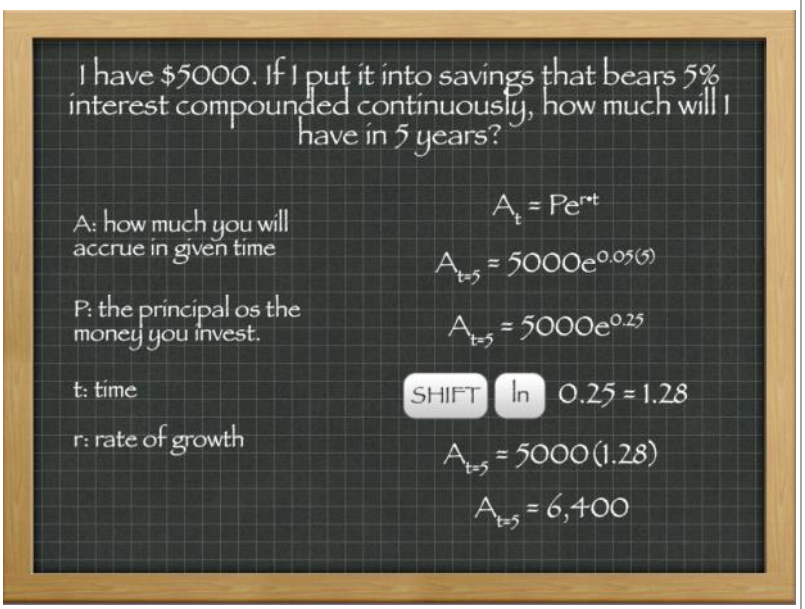
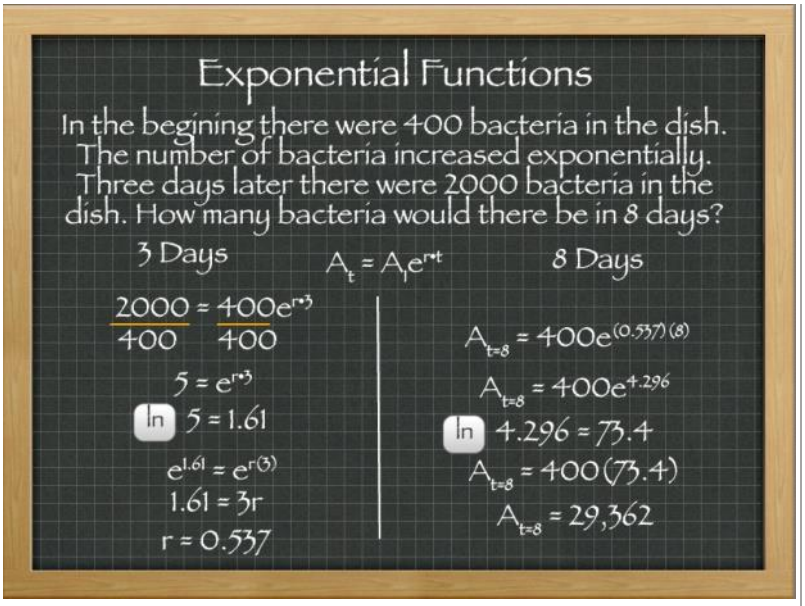
Slide	Notes
	
	You have gotten some of the background on these in your lesson on natural logarithms. There are so many scientific and daily life applications of exponential functions that getting a good handle on them will serve you well in adult life. Here is a great example from daily life as you decide how to invest the money that you earn. I have $5000. If I put it into savings that bears 5% interest compounded continuously, how much will I have in 5 years? Let's designate a few variables: A will be the ending value or how much we will accrue in the given time. P is the principle or how much money you started with T is time R is the rate of growth We will take the principle and multiply it by e raised to rate time. Remember from the logarithm lesson that e is designed to work with compounding growth. The exponent can be simplified to 0.25 Let's plug in our values. We need to work out what the e will be replaced with by finding the antilog of 0.25. That is 1.28. Now we will multiply that growth factor to the original investment amount of $5000. We will have $6,400 dollars at the end of 5 years.
	In the beginning there were 4000 bacteria in the dish. The number of bacteria increased exponentially. Three days later there were 2000 bacteria in the dish. How many bacteria would there be in 8 days? This one is stepped up in complexity because we don't have our rate



bacteria increased exponentially. Three days later there were 2000 bacteria in the dish. How many bacteria would there be in 8 days?

This one is stepped up in complexity because we don't have our rate. This one will give us a change to practice the natural logarithm so we can find rate. The clue we are given is the population at 3 days. The first of our 2 main tasks then is to find the rate of growth. Then we can find how many bacteria there will be in 8 days.

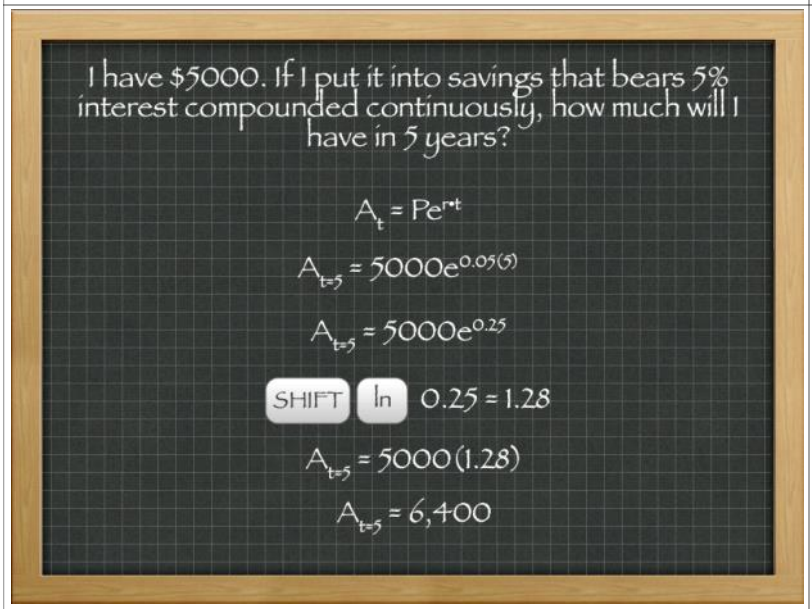
In both major steps we will use our equation much like the first example. We will just use A sub t for total accrual of bacterial population and A sub will be the initial population.

OK, let's find the rate. We will plug in the numbers for the first scenario at 3 days growth. Simplify. We will find the natural log of 5 which is 1.61.

Now both sides have the same base, so we can set the exponents equal to each other to find the rate. The rate of growth is 0.537.

Now we have the r to plug in to the other half of our solution path. The initial population is 400. We plug in our numbers for rate and time. Simplify the exponents.

Now to work on the e growth factor. The natural log of 4.296 is 73.4. We multiply and get 29,362 bacteria at the end of 8 days.



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