Exponential Growth
Use What You've Learned

After watching the video, *Exponential Growth*, complete the following problems.

1. In late 2009, a good CD (Certificate of Deposit) had an "annual yield" of 2%. In other words, an investment would grow exponentially, with a growth rate of 2%. Say you invested $1000 in 2009.

   a. How much is your investment worth in 2014? One way to solve this problem is to think recursively. Recursion involves a repeated application of a procedure to find successive results. How much would you have one year later, in 2010?

      i. What is the initial investment?

      ii. How would you find the value of your investment one year later, in 2010?

      iii. You can write a recursive equation using two pieces of information. First, you need to know the initial value of the investment. Second, you need to know the repeated procedure, in this case, multiplying by 1.02. Using the terms *Now* and *Next*, write a recursive equation.

      iv. Use your recursive equation in (iii) to complete the table and find the value of the CD in six years.

# of years since 2009	0 (2009)	1 (2010)	2 (2011)	3 (2012)	4 (2013)	5 (2014)
Value						

   b. How much is your investment worth in 2014? Another way to solve this problem is to think explicitly. In other words, if you know the number of years you can use the equation to directly find the value of the CD.

   c. Which type of equation might be used if you are finding the value of the investment after a couple years? Which type of equation might be used if you are finding the value of the investment after many years?

   d. How much would you have in 2029?

© 2010 UNIVERSITY OF NORTHERN IOWA

2. Assume we want to graph $y = 2^x$. We could use a scale of one unit per inch - the point (2,4) would be 2 inches to the right of the origin, and 4 inches above the origin.

   a. How high would the point be that was 6 units to the right of the origin?

   b. How high would the point be that was **one foot** to the right of the origin?

   c. How high would the point be that was **one yard** to the right of the origin? Give your answer in miles.

3. Assume we have an exponential growth equation $y = a(1+r)^x$, with a growth factor of 0.5 percent.

   a. Fill in the following table:

x	y
0	162
1	
2	
3	
500	

   b. What is the value of *a* in the equation $y = a(1+r)^x$?

© 2010 UNIVERSITY OF NORTHERN IOWA

4. As of 2009, the population of Wentzville, Missouri was 22,478 people. Since 2000, it has had a population growth rate of 200.88%.

   a. If Wentzville continues to grow at about 200% per decade, what will be the population one decade from now?

   b. Write an exponential growth equation relating time in decades and total Wentzville population.

© 2010 UNIVERSITY OF NORTHERN IOWA