Name_____ Date_____

Ch.8 EXPLORING DATA: Compound Interest and Exponential Growth

Simple Interest is paid only on the initial principal.

Compound Interest is paid on the initial principal **and** on previously earned interest.

When a bank pays interest on both the principal and the interest an account has earned, the bank is paying compound interest.
The **Compound Interest Formula** for the amount A in an account is:

See what happens when a principal of $1000 is invested at a rate of 10% for 1 year and **n** gets greater and greater. Use a calculator.

Number of times Compounded Per year (n)	**$P(1 + r/n)^{nt}$**	**Value of A**
Annually		
Semi-annually (2)		
Quarterly (4)		
Monthly (12)		
Daily (365)		
Hourly (8760)		
By the minute (525,600)		

1. Describe what happens as **n** gets greater and greater.

2. What would happen if P changed? Give several examples to support your answer.

3. What would happen if **t** changed? Give several examples to support your answer.

Use the Compound Interest Formula to solve the following problems.

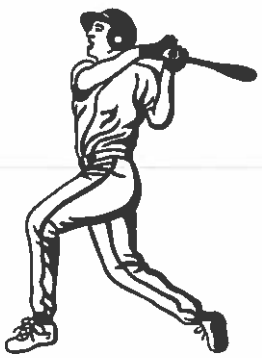
1. The amount of $500 is deposited into an account that pas 9.5% compounded monthly. What is the balance in the account after 3 years? After 5 years?

2. Suppose you have $250 to invest. The bank near your home pays 8.2% compounded semiannually and the bank near school pays 8% compounded quarterly. In which account should you invest your money?

3. How much should you deposit in an account that pays 6.75% interest, compounded monthly, to have a balance of $2500 after 2 years?

4. You have inherited a pearl ring with diamonds from your grand mother, that has an appraised value of $1880 in 1946. It is now the year 2000, and the appraised value of the ring has increased by approximately 5% each year. What is its value now?

5. Your collection of baseball cards cost you $150 in 1987. In 1999, the value of your cards has increased by approximately 7.5% each year. What is the value of the cards in 1999?



The Compound Interest Formula is in the general form of an exponential function. It is an example of exponential growth.

The general form of exponential functions can be represented as:

Exponential Growth:

Exponential Decay:

Look at the graphs of: $y = 2^x$ $y = (1/2)^x$
$y = 4^x$ $y = (1/4)^x$
$y = 7^x$ $y = (1/7)^x$

Also graph: $y = 10(2)^x$
$y = 6(2)^x$
$y = 2(2)^x$

Relating to the Real World: Hospital Work

Suppose a hospital prepares a 100-mg supply of technetium-99m, which has a half-life of 6 hours. Technetium-99m is a radioactive substance that is widely used to diagnose thyroid, brain, liver, and kidney diseases. As technetium-99m decays, it emits low-energy gamma rays. These rays are detected by a gamma camera to produce images of the inside of your bodies so doctors can detect where, and what the problem is.

The Problem: The amount of technetium-99m is reduced by one half every 6 hours, as shown in the table. The initial amount of technetium is 100 mg. The decay factor is 0.5. Let y represent the amount after x half-lives have occurred.

a.) Find the expontial decay function.

b.) Find the amount of technetium-99m remaining after 75 hours.

Number of 6-h Half-lives	Technetium-99m Present (mg)
0	100
1	50
2	25
3	12.5
4	6.25
5	3.125
6	1.5625