<u>Applications of Logs</u>   Name _____

1. Tightwad, Missouri, has a town bank titled Tightwad Bank. Ebenezer Scrooge III makes a deposit of $2000 in 1980 into an account bearing 5.5% interest compounded continuously. How many years will he need to wait until his account has enough to pay for Tiny Tim II's surgery, which is $15,000?

2. The Stimulus Banking Corporation has government backing, and as such, deposits are guaranteed to grow at a rate of 3.1% compounded continuously. A deposit is made in 2012 of $9000. How long does it take for the deposit to double?

3. The Merchant of Tennis is a company that specializes in upscale tennis equipment. At a tournament, they agree to supply 1200 tennis balls. Due to the poor skills of the participants, tennis balls are lost at the rate of 17% per hour. How long until there are only half as many balls as they started with?

See, we don't just make these things up!!

4. A Brewed Awakening is a cappuccino and espresso company that is seeing an increase in customers. They opened in 1995 and had 200 loyal customers. They have steadily increased their customer base by 6% per month. How many years before they will have 500 customers?

5. The Chipsy King Sandwich Shoppe is having a problem with potato chips being dropped on the floor. When they open in the morning 15 chips were counted on the floor. The chips seem to double every 30 minutes. How long until there are 200 chips on the floor?

6. Albert currently pays a $608 premium for health insurance. If the premium increases at an annual rate of 8.01% per year, how many years will it take for the premium to be $2,086.06?

7. Brad created a chart that shows the population of a town will increase to 96,627 people from a current population of 11,211 people. The rate of increase is an annual increase of 4.18%. Brad forgot to include on the graph the number of years this increase will take. How many years should Brad add to the chart?

8. Chemists define the acidity or alkalinity of a substance according to the formula $pH = -\log[H^+]$

Where H^+ is the hydrogen ion concentration, measure in moles per liter. Solutions with a pH value less than 7 are acidic. Solutions with a pH value greater than 7 are basic.

The hydrogen ion concentration of apple juice is 0.0003. Find the pH value and determine whether the juice is basic or acidic.

9. The hydrogen ion concentration of ammonia is 1.3×10^{-9}. Find the pH value and determine whether the ammonia is basic or acidic.

10. Brad bought office equipment that his company estimates will depreciate in value a certain percent each year. He receives the following data 5 years after purchasing the equipment.

t (in years)	0	1	2	3	4	5
$C(t)$ (worth of equipment)	5,141	4,860	4,590	4,300	4,100	3,850

Write an exponential model for this data. Round to three decimal places.

Use logs to determine when the office supplies will be "worthless" (that is, $100). Round to three decimal places.

11. Robemblind Accounting offers two different investment options in a stock plan. The first plan(Plan A) will return $100 initially and $50 each week. The second plan (Plan B) will return $0.50 initially and will double each week.

b. Which plan would make you more money at 8 weeks? How much money would you make?

c. If you were planning to invest for 11 weeks, which plan would you use? Why?

d. If you had your heart set on Plan A, what week would be the final week that it would be worth investing in Plan A?

12. You purchased an ATV for $1500 three years ago. After some wear and tear, you are ready to sell and buy a new one and you are trying to figure out if it is worth it. Customer A makes an offer assuming that you lose $200 in value for each year that you own the ATV, customer B says that you lose 10% of the value each year and makes an offer based on that information.

a. Write an equation to model each offer.

b. Whose offer will you take? What will they offer you?