Assignment for a Typical College Algebra or Precalculus Course
Total Points: 20

Learning Goals

1. To understand exponential and log functions
2. To apply exponential and log equations to exponential growth and decay problems
3. To understand how carbon dating works and the political controversy surrounding it.

Instructions

Read my article "Connecting Algebra to Real World Issues" located at
http://userhome.brooklyn.cuny.edu/skingan/Kingan_p.238-242.pdf

Learn Exponential and Log functions by watching Khan Academy videos. Links to videos for precalculus topics are at http://userhome.brooklyn.cuny.edu/skingan/precalculus/PrecalculusVideos.html
Scroll down to Algebra Topic no 27 and watch those videos in particular.

Radioactive decay and carbon dating is the third set of applications in a set of five applications. Before solving these problems go through my notes of Exponential Growth and Decay Problems.

Radioactive substances have a half-life. That is the amount of time it takes a certain amount of the material to become half the initial amount. For example, the half-life of radioactive Plutonium-239, which is used in bombs, is 25,000 years. So it takes 25,000 years for 4 grams of Pu-239 to become 2 grams. When organic matter dies, its Carbon 12 content remains fixed while its Carbon 14 (radioactive carbon) content decays with a half-life of 5700 years. The ratio of Carbon 14 to Carbon 12 is 1 to 10^{12}. That means $\dfrac{Carbon14}{Carbon12} = \dfrac{1}{10^{12}}$. To estimate the age of

dead organic material the model used is $y = \dfrac{1}{10^{12}} 2^{\frac{-t}{5700}}$ where y is the ratio of Carbon 14 to Carbon 12 present in t years.

1) The $\dfrac{Carbon14}{Carbon12}$ ratio of a fossil is $\dfrac{1}{10^{13}}$. Find the age of the fossil. (Larson & Hostetler)

2) The statue of Zeus at Olympia, Greece is made of gold and ivory. The ivory was found to have lost 35% of its Carbon-14. How old is the statue? (Beecher et al)

3) The linen wrapping from one of the Dead Sea Scrolls had lost 22.3% of its Carbon-14 at the time it was found. How old was the linen wrapping? (Beecher et al)

Grading Rubric/Assessment

1)There is one correct solution to the three problems in the assignment. In order to get full credit students must have the correct solution and all the in between steps must also be correct.

2) Partial credit will be generously given if the final answer is wrong, but the steps are more or less correct.

3) You may work in teams and help each other, but each student has to submit individual work and not just copy from a friend. It is easy to tell when a student just copies without understanding.