

Logarithms in Practice

1. How many years will it take \$5,500 to amount to \$8,000 if it is invested at an annual rate of 9% compounded monthly?

2. *Radioactive Decay Model:* If P is the initial mass of a radioactive substance with a half life h , then the mass remaining A , at time t is modeled by:

$$A = Pe^{-rt}$$

where $r = \frac{\ln 2}{h}$.

A skeleton of a cat was found in a well and has a ratio of carbon 14 to carbon 12 that is 61% of the corresponding ratio for living things. (Carbon 14 is only made by living things, carbon 14 begins to decay to carbon 12 upon death. The half-life of carbon 14 is 5730 years.) About how long ago did the cat die?

3. *Newton's Law of Cooling:* If D is the initial temperature difference between an object and its surroundings, and if its surroundings have a temperature T , then the temperature of the object A and time t is modeled by:

$$A = T + De^{-kt}$$

where k is a positive constant that depends on the type of object.

Initially coffee has a temperature of 200°F in a room that is 70° . After ten minutes the temperature is 150° . What will the temperature of the coffee be after an additional ten minutes passes?