

Exponential Growth and Decay

1. A scientist isolates 2000 grams of a radioactive isotope. Five hours later, 1800 grams are left. Assuming this isotope decays exponentially, answer the following questions.
 - (a) If the scientist returns in 5 more hours, how much of the isotope will remain?

- (b) What is the half-life of this isotope? The half-life is the time it takes for the quantity of a substance to reduce to half its original value.

2. The populations of Ant Hill A and Ant Hill B are both growing exponentially. The following population data was recorded one day:

Ant Hill	12:00pm	5:00pm
A	100	120
B	80	150

Approximate the time at which the population of Ant Hill B will first exceed the population of Ant Hill A.

3. Suppose you boil a kettle of water and pour it into a cup to make tea. Initially, the water is 100°C , and it cools to 80°C in 10 minutes. How long will it take to reach a drinkable temperature of 65°C if the room is 25°C ?

4. It's Thanksgiving morning and you have a feast to prepare. You place your thawed, room temperature (70°F) turkey into a preheated oven (325°F) at 10 am. When you check the turkey at 11 am, the internal temperature of the turkey has reached 102°F . Will it reach a safe 180°F by the time your guests arrive at 4 pm?