

Logs and Exponentials LE6: Applications (part 3)

1. A man bakes a penguin at 350° . He takes the flightless creature out of the oven and sets it on the counter to cool. The room is 50° . After 5 minutes, the penguin is 300° . How long until the penguin is 200° ?

2. The penguin population at a local pond is governed by the equation: $P = \frac{20}{1+9e^{-0.1t}}$

a) How many penguins were initially in the pond?

b) What is the maximum number of penguins that the pond can sustain?

c) When will the pond be at least half full of penguins?

3. A penguin named Charlie sees an ad in the paper for a bank that gives 2% interest on their savings accounts, compounded continuously. He really likes his own bank though. So he goes and sees the manager of his bank and asks him to meet the offer of the other bank. The manager says that it will be tough since his bank only compounds monthly and not continuously. But the manager agrees to give Charlie 2.002% interest if he will keep the account he has. Is the offer good enough, or should he switch banks?

4. The magnitude of an earthquake is related to the amount of energy the earthquake produces. Geologists use the equation $\log_{10}E = 11.8 + 1.5M$, where M is the magnitude of the earthquake and E is the energy in ergs. How much energy was produced by the 6.0 earthquake in Alaska that happened on 1/31/2013? How many penguins felt the earthquake?

5. The relationship between intensity I of light (in lumens) at a depth of x feet in Lake Erie is given by $\log_{12} \frac{I}{12} = -0.00235x$. If a penguin is swimming 40 feet below the surface, what is the intensity of light that she sees?