

Exponential word problems

① WHEN A MURDER IS COMMITTED, THE BODY ORIGINALLY AT 37°C COOLS ACCORDING TO NEWTON'S LAW OF HEATING & COOLING. AFTER 2 HOURS THE TEMPERATURE IS 35°C & THE TEMPERATURE OF THE SURROUNDING AIR IS CONSTANT AT 20°C . IF THE BODY WAS FOUND AT 4 PM AT A TEMPERATURE OF 30°C WHEN WAS THE MURDER COMMITTED?

② ON A HOT SUMMER DAY YOU BUY A 6-PACK OF BEER. THE BEER, NOT HAVING BEEN REFRIGERATED IS 30°C . SO YOU TAKE IT HOME & PUT IT IN YOUR FRIDGE WHOSE TEMPERATURE IS 5°C . ONE HOUR LATER THE BEER IS 18°C . WHEN WILL IT BE 8°C ?

③ THE POPULATION OF EARTH HAS A DOUBLING TIME OF 57 YEARS. THE POPULATION OF EARTH WAS 4.368 BILLION IN 1982. WHAT WAS THE POPULATION IN 2001? WHAT WILL IT BE IN 2025?

(4) In 1865 there were 60000 rabbits in Australia. In 1867 the number had increased to 2400000.

Assuming continuous exponential growth, how many rabbits were there in 1870? In 1900?

What is their doubling-time (in days)?

Assuming this all happened when 2 rabbits escaped, when did this happen?

(5) You accidentally inhale some poisonous fumes. Not feeling well you see a doctor, 20 hours later.

A blood test at the time shows a poison concentration of 3.72 mg/cc .

8 hours later, a second blood test measures 2.19 mg/cc .

Assuming that the body excretes the poison following an exponential decay curve

(a) Serious renal damage will be done if the concentration of poison in blood was even as high as 15 mg/cc . Are you in trouble? Explain.

(b) You can resume normal activities when the concentration gets down to 0.1 mg/cc . How long after inhaling fumes will that take?

(c) What is the $\frac{1}{2}$ life of this poison?

Graph the following functions

① $y = -2^x$

② $y = 1 + 3^x$

③ $y = -1 - (\frac{1}{2})^x$

④ $y = 4^x$

Solve for y.

① $\log_2 y - \log_2 x = 4$

② $2 \log_4 y + \frac{\log_4 x}{3} = 2$

③ $\frac{\log_3 x}{\log_3 (\frac{1}{3})} - \log_3 y = 1$

④ $6 \log_5 y + 2 \log_5 x = 3 \log_5 x$