MR12 Lesson 48

Aim: How do we solve verbal problems using logarithms?

HW: Text Page 343-344
10,11,13,15-20 page 346 # 14

Do Now: 1. Jake wants to double his money every month. The first month he started with $1 and then the second month he had $2. How many years will it take until he has at least $100,000?

Answer: $100,000 = 2^x$

Jan 6-8:40 AM

2. Max invests $2500 at a bank offering 6% compounded quarterly. If untouched how many years will it take for him to earn $1000?

$A = P(1 + r/n)^{tn}$

$2500 + 1000 = 2500(1 + .06/4)^{4t}$

$3500 = 2500(1.015)^{4t}$

$\frac{3500}{2500} = (1.015)^{4t}$

$1.40 = (1.015)^{4t}$

$\frac{\log 1.40}{\log 1.015} = 4t \frac{\log 1.015}{\log 1.015}$

$\frac{22.599}{4} = \frac{4t}{4}$

5.6 years = t

Jan 6-9:25 AM

3. Tamika invests $500 at a bank offering 10% compounded continuously. $A = Pe^{rt}$

a.Find the amount of the investment at the end of 5 years (if untouched).

b.Find how long it will take to double the investment?

$1000 = 500e^{.10t}$

$1000/500 = e^{.10t}$

$2 = e^{.10t}$

$\ln 2 = .10t \ln e$

$\frac{\ln 2}{.10} = t$

$6.9 = t$

Jan 6-9:29 AM

4. DECAY

Half-Life: Radium-226, a common isotope of radium, has a half-life of 1620 years. Professor Korbel has a 120 gram sample of radium-226 in his laboratory. How many grams of the 120 gram sample will remain after 100 years?

First we must find the rate of decay or the constant of proportionality (k) for radium-226. Since decay is occurring continuously the natural log (e) must be used.

$y = y_0 e^{kt}$

$60 = 120e^{k1620}$

$\frac{1}{2} = e^{1620k}$

$\ln\frac{1}{2} = \ln e^{1620k} = 1620k \ln e$

$\frac{\ln 1/2}{1620} = k$

$k \approx -0.0004286863$

Why is k negative?

Find the amount left after 100 years .

$A = 120e^{-0.0004286863(100)}$

$A = 120e^{(-0.0004286863*100)}$

$A = 114.9738694$

Jan 6-9:38 AM

Jan 6-10:06 AM