

APPLICATION PROBLEMS USING LOGARITHMS

Solve. Round answers to the nearest tenths place, unless otherwise specified.

- A radioactive isotope has a half-life of 4 days. How many days will it take for a 10 g sample of the isotope to decay to 3 g?
6.99 ~~years~~ days
- About how old is a bone that originally contained 200 g of carbon-14 and now contains 80 g of that isotope?
7363.14 years
- What is the decibel voltage gain of an amplifier with an output voltage of 48 volts and an input voltage of 0.8 volts?
17.80 volts
- Kevin deposits \$1000 at 9% annual interest, compounded quarterly. How long will it take for the account to earn \$1000 interest?
7.8 years
- Diane invests \$4000 at 10% annual interest, compounded monthly. How long will it take for the account to earn \$1000 interest?
2.2 years
- Jon invests \$2300 at 7.5% annual interest, compounded semiannually. How long will it take this money to double in value?
9.4 years
- The Lichtfoots put \$8500 into an investment plan paying 8.5% annual interest, compounded quarterly. How long will it take this money to double in value?
8.2 years
- A sample of a bone found at an archaeological site contains 50 mg of carbon-14. The sample originally contained 175 mg of that isotope, and the half-life of carbon-14 is 5570 years. Find the approximate age of the bone, to the nearest 100 years.
10,100 years
- A fossil sample now contains 60 mg of carbon-14. There were originally 133 mg of carbon-14 in the sample. Find the approximate age of the fossil, to the nearest 100 year.
6,400 years
- An isotope has a half-life of 80 days. How many days will it take for a 7 mg sample of this isotope to decay to 1 mg? Round the answer to the nearest whole number.
225 days
- An isotope has a half-life of 90 days. How many days will it take for a 5 g sample of this isotope to decay to 1 g? Round the answer to the nearest whole number.
209 days
- The voltage input of an amplifier is 0.5 volts and its voltage output is 52 volts. Find the decibel voltage gain.
20.2 decibels
- If the voltage output of an amplifier is 46 volts and its voltage input is 0.8 volts, what is the decibel voltage gain?
17.6 decibels
- A transmission line has an input voltage of 0.6 volts and an output voltage of 54 volts. Find the decibel voltage gain.
19.5 decibels
- A transmission line has an input voltage of 0.4 volts and an output voltage of 29 volts. Find the decibel voltage gain.
18.6 decibels
- Use $A = Pe^{rt}$ for this problem. If \$1000 is deposited at an annual rate of 8.25% compounded continuously, how long will it take for the account to double in value?
8.4 years
- Marla deposited \$8000 in an account for which interest is compounded continuously. At the end of 1 year, interest in the amount of \$410.17 had been credited to the account. Use the formula in Problem 16 to find the annual interest rate as a percent.
5%
- A scientist is given a piece of fossilized tree trunk that is thought to be over 5000 years old. The scientist determines that the sample contains 65% of the original amount of carbon-14. Is the reputed age of the tree correct? Justify your answer.
No, the tree is only 3,462 years old