

For the following word problems, decide among Exponential Growth, Exponential Decay, Compound Interest, or Half-life, and solve accordingly.

1. The population of Jacksonville was 3,810 in 2007, and is growing at an annual rate of 3.5%. If this growth rate continues, what will be the approximate population in 2020?
2. Potassium-42 has a half-life of 12.4 hours. How much of an 848 g sample of potassium-42 will be left after 62.0 hours?
3. The population of China was 1,210,005,000 in 1996 and was growing at a rate of about 6% per decade.
 - a. Predict the population, to the nearest hundred thousand, of China in 2016.
 - b. Predict the population, to the nearest hundred thousand, of China in 2021.
4. Find the final amount for an investment of \$1200 earning 5% interest compounded semiannually for 10 years.

5. A certain medication is eliminated from the bloodstream at a rate of about 12% per hour. The medication reaches a peak level in the bloodstream of 40 milligrams. Predict the amount, to the nearest tenth of a milligram, of the medication remaining 2 hours after the peak level and 3 hours after the peak level.

6. Find the final amount for an investment of \$900 earning 6% interest compounded quarterly for 15 years.

7. The population of India was 952,108,000 in 1996 and was growing at a rate of about 1.3% per year. Predict the population, to the nearest hundred thousand, of India in 2000 and 2010.

8. The half-life of hafnium-156 is 0.025 seconds. How long will it take a sample to decay to 25% of its original mass?

9. When a plant or animal dies, it stops acquiring carbon-14 from the atmosphere. Carbon-14 decays over time with a half-life of 5730 years.
 - a. What percent of the original carbon-14 remains in a sample after 2500 years? 5,000 years? 10,000 years?

 - b. An archeologist found a bison bone that contained about 37% of the carbon-14 present when the bison died. Estimate the age of the bone when it was found.

10. Find the final return for an investment of \$500 earning 5.5% interest compounded continuously for 12 years.
11. The first stage of the Saturn 5 rocket that propelled astronauts to the moon burned about 8% of its remaining fuel every 15 seconds and carried about 600,000 gallons of fuel at liftoff. Estimate the amount of fuel remaining, to the nearest ten thousand gallons, 2 minutes after liftoff.
12. Chromium-48 has a half-life of 21.6 hours. How much of a 30.6 g sample will be left after 32.0 hours?
13. Suppose that you buy a car for \$15,000 and that its value decreases at a rate of about 8% per year. Predict the value of the car, to the nearest cent, after 4 years and after 7 years.
14. The value of a painting is \$12,000 in 1990 and increases by 8% of its value each year. What is the painting's value in 2005?