

## Exponential Worksheet Exponential Growth and Decay

1. Assume you invest \$5,000 in an account paying 8% interest compounded monthly. How much money will be in the account after 5 years?
2. Find the amount of money you will have after 10 years if \$15,000 is invested in accounts paying 6% interest compounded:
  - a. Annually
  - b. Quarterly
  - c. Monthly
  - d. Daily
3. Would it be better to invest \$10,000 for 8 years at 8% interest compounded quarterly or 6.5% interest compounded every second? Justify your answer.
4. Derek invested \$1,500 into an account that pays 9% interest compounded monthly. How much will be in the account after 4 years?
5. Rebecca invested \$15,000 into an account that pays 10% interest compounded daily. How much will be in the account after 20 years?
6. E.Coli. bacteria have a growth rate of 116% per hour. Assume that there are initially 500 E.Coli. bacteria infecting the body. How long will it take for the bacteria population to grow to 17 million?
7. If the world population is about 6 billion people now and if the population grows quarterly at an annual rate of 1.7%, what will the population be in 10 years?

8. In 1996 the population of Russia was 148 million and the population of Nigeria was 104 million. If the populations of Russia and Nigeria grow weekly at annual rates of -0.62% and 3.0%, respectively, when will Nigeria have a greater population than Russia?

9. A promissory note will pay \$30,000 at maturity 10 years from now.

How much should you be willing to pay for the note now if the note gains value at a rate of 9% compounded semi-annually?

10. At what annual rate compounded annually will \$1,000 have to be invested to amount to \$2,500 in 10 years?

11. As long as a plant or animal is alive, carbon 14 is maintained in a constant amount in its tissues. Once dead, however, the plant or animal ceases taking in carbon, and carbon 14 diminishes by radioactive decay. Estimate the percentage of the original  $C_{14}$  in a skull uncovered in an archaeological site if it is 18,600 years old. The half-life of  $C_{14}$  is 5730 years and the growth factor for  $C_{14}$  is  $\left(\frac{1}{2}\right)^{\frac{1}{5730}}$  or about 0.9998790392.

12. What percentage increase will you have if your money is invested at 15% compounded annually for twelve and a half years?