

Some More Word Problems

1. Jim's grandparents started a "life-insurance with cash value" policy when he was born in 1990 with an initial investment of \$10,000. Now that Jim is leaving the house his grandparents have transferred the funds into his name. In 2010, the investment has a cash value of \$24,121.51 (so if Jim decides to cash out he will be given the cash value of the investment). What effective annual interest rate would his grandparents had to acquire (through Cash Deposits (CDs) or a bank's savings account) to have the same return? Assuming this rate will continue for the next few years, would you leave the money there or move it?

2. An advertisement for real estate published in the 26 July 2004 electronic edition of the New York Times states:

Did you know that the percent increase of the value of a home in Manhattan between the years 1950 and 2000 was 721%? Buy a home in Manhattan and invest in your future.

Suppose instead of buying a home in Manhattan in 1950, someone had invested money in a bank account that compounds interest once per month. What annual interest rate would he bank have to pay to equal the growth claimed in the above ad?

3. Browsing cars in a car-lot you see a sign in the window of a car that offers you a choice between two deals. \$1,000 back now (which people tend to use towards the principal) or 1.5% reduced interest rate. The standard rate for a loan between \$12,000 and \$20,000 is 5.29%. for 5 years. Which offer do you take?

4. You have four ten-year loans you took out to pay for college. Below is a table fo the loans taken and their respective effective annual interest rates (AIR):

| | | | | |
|-----------|-------|-------|--------|--------|
| loan (\$) | 8,000 | 9,000 | 10,000 | 12,000 |
| AIR (%) | 3.51 | 4.22 | 5.01 | 6.31 |

After graduation you are given the option of consolidating (that is take out one loan to pay off *all* the balances on your current loans). What rate would you need to be offered to make this worth doing?

5. Suppose a colony of 50 bacteria cells has a continuous growth rate of 35% per hour. Suppose a second colony of 300 bacteria cells has a continuous growth rate of 15%. How long does it take for the two colonies to have the same number of bacteria?

6. A scrap of paper taken from the Dead Sea Scrolls was found to have a carbon-14 to carbon-12 ratio of .795 times that found in plants living today. Given that the half-life of Carbon=14 is 5,730 years, estimate the age of the scroll.