

Compound interest is an example of exponential growth. Something grows exponentially if it increases by a fixed multiple for each time period. For Alfredo, the amount of money he had grew by a multiple of 1.07 each year. After  $n$  time periods, it would have grown by a factor of  $1.07^n$ . Hence the name *exponential growth*.

Population often grows exponentially. In Display 2.25 are world population figures from 1950 to 2000.

Year	Population
1950	2,500,000,000
1960	3,050,000,000
1970	3,700,000,000
1980	4,450,000,000
1990	5,250,000,000
2000	6,050,000,000

Display 2.25

Starting from 1950, the population grew by about 20% per decade.

1. Calculate what the population would have been in 1960, 1970, 1980, 1990 and 2000 if the population had grown at exactly 20% per decade.
2. How do your calculated figures compare with the true values in Display 2.25?
3. Estimate world population in the years 2010 and 2020.



If the multiple is less than 1, we have **exponential decay**. For example, suppose 1,000,000 people knew how to use a slide rule in 1970, about the time inexpensive calculators first became widely available. If the number of people who knew how to use a slide rule then declined by 5% per year, then in 1971 we would have  $100\% - 5\% = 95\%$  as many, or 950,000. In 1972, we would have  $1,000,000 * 0.95^2 = 902,500$ .

According to this scenario, how many people would know how to use a slide rule in the year 2010? In 2020?

