U4D8   Warm Up:
A bacteria colony doubles every minute. If there are
10 bacteria in the colony initially, how many are
there in 9 minutes?

In general, for exponential growth / decay problems:
where,

   $f(x)$ is the _____ value

   a is the _____ value

   b is the _____ (if b > 1) OR

         the _____ (if 0 < b < 1)

   x is the number of _____ or _____ periods

Important Notes:
If a growth rate is given (as a percent), then the base of the power in the
equation (b) can be obtained by

_____
ex. A growth rate of 18% involves

Also, the units for the growth and decay rate and for the number of growth
and decay periods

_____
      ex. _monthly_ interest rate of 0.05%,

Growth Problem

1. Maryville had a population of about 7500 people in 2009. It is expected that the town's population will increase 5% each year.
    a. What is the initial population?

    b. What is the growth rate, r?

    c. Write the algebraic model for this situation using the above information. Include let statements.

    d. Use the model to predict the population in 2018.

    e. In approximately what year will Maryville double its current population, assuming it continues to grow at this rate? Predict to the nearest tenth of a year.

Decay Problems

2. A 200g sample of radioactive polonium-210 has a half-life of 138 days. This means that every 138 days, the amount of polonium left in a sample is half of the original amount.

   a. What is the rate of decay?
   b. Determine an equation to model this situation. Include let statements.

   c. Determine the mass that remains after 5 years.

   d. How much polonium-210 was there 414 days ago?

   e. Use your model to predict how long it would take for this 200g sample to decay to 110g.

3. A new car costs $24,000. It _loses_ 18% of its value each **year** after it is purchased. This is called depreciation.

   a. Write an equation that models the decay/decline of the investment. Include let statements.

   b. Use the equation to determine the value of the automobile after 30 **months**.

   c. If the car was purchased June 3, 2015, during what **month** would the cars value first fall below $10 000?