MCR3U1 Solving Word Problems Name:

All solutions are to be placed in the space provided; use proper mathematical notation.

1. The growth in population of a small town *since 1998* is given by the function $P(n) = 1250(1.05)^n$ where P represents the population and "n" represents the number years since 1998. (5 marks)

   a. What is the initial population? _____ , and what is the growth rate? _____

   b. Determine the population in 2016.

2. An ant colony grows by 12% in number every month. Currently, there are 30 000 in the nest. (6 marks)

   a) Write an equation that models the number of ants in the colony, given the number of months.

   b) Predict the size of the colony in (i) three months, and (ii) 2 years.

3. A new car costs $24000 and loses 18% of its value each year after it is purchased.

   a) Write the equation that models the value of the car *n* years after it was purchased.

   b) How much of the car's initial value is lost after 5 years?

   c) What is the value of the car after 30 months?

4. The half-life of ruthenium-106 is 1 year, so the decay of ruthenium-106 is described by the exponential equation $A_L = A_O\left(\frac{1}{2}\right)^t$, where t is the elapsed time, in years. If an original sample of ruthenium-106 had a mass of 128 mg, and there are 2 mg left, what is the elapsed time? (2 marks)

5. The biological half-life of thyroid hormone T4 is about 6.5 days. If a dose of T4 was not followed by repeat doses (4 marks)

   a) what fraction of the original dose would remain in the body after 19.5 days?

   b) how long would it take until only 6.25% of the original dose would remain in the body?