**Working with Exponential Models**

**Part A: Investigating a Leaky Tire**

Alberto has a car tire with a slow leak. He measures the tire pressure every day for a week and records the following data:

|  |  |  |
| --- | --- | --- |
| Time, ***t*** (days) | Pressure, ***P,*** (kPa) |  |
| 0 | 400 |  |
| 1 | 280.56 |  |
| 2 | 234.97 |  |
| 3 | 196.79 |  |
| 4 | 164.81 |  |
| 5 | 138.03 |  |
| 6 | 115.60 |  |
| 7 | 96.81 |  |

1. Sketch the graph in the space below:



1. What kind of relationship seems to exist between time and pressure? Justify your answer.
2. Calculate the finite ratios in the table above. What does this tell you about the growth rate of the data?
3. Model the data above with an appropriate equation.

1. Use your equation to answer the following questions. Show your work.
	1. What will the pressure be after 10 days?
	2. What will the pressure be after 20 days?
2. According to the equation, when will the air pressure reach 0 kPa? (There is a trick to this question!)

**Part B: Investigating a Petri Dish**

This data gives the population growth of bacteria cells in a petri dish that was inoculated by a swab from an infected wound:

|  |  |  |
| --- | --- | --- |
| Time, ***t*** (hours) | Number of bacteria cells |  |
| 0 | 250 |  |
| 1 | 525 |  |
| 2 | 1103 |  |
| 3 | 2315 |  |
| 4 | 4862 |  |
| 5 | 10210 |  |

1. Sketch the graph in the space below:



1. What kind of relationship seems to exist between time and number of bacteria? Justify your answer.
2. Calculate the finite ratios in the table above. What does this tell you about the growth rate of the data?

Homework:

1. The number of hybrid vehicles sold in the United States, S, can be modelled by the formula

 $S=199 148(2.39)^{n}$, where n is the number of years since 2005.

1. Evaluate $S=199 148(2.39)^{n}$, where $n=0$. What does the answer represent?
2. Estimate the number of hybrid vehicles sold in 2004.
3. Predict the number of hybrid vehicles that will be sold in 2007.
4. Page 363 #8
5. Model the data above with an appropriate equation.

1. Use your equation to answer the following questions. Show your work.
2. What will the bacteria population be after 12 h?
3. After 2 days?
4. After 30 days?
5. In real life, will the bacterial population continue to grow like this?
6. Instead of growing as shown in the table above, the bacteria started with 250 cells and increased by a constant amount of 250 cells each hour. What type of equation would model this data?
7. Now suppose that the number of cells in the petri dish remained constant at 250 no matter how much time passed. What type of equation would model this data? Sketch a graph.