Population Explosion

This investigation will help us determine whether the human population explosion is typical of other living organisms. A common microscopic, single-celled organism is the paramecium. It reproduces by binary fission - one cell divides to become two. Each of the new cells divides again, making four, then eight, *etc*. Because paramecia live and reproduce in water, their population growth can be observed easily. In one investigation 0.5 mL samples of water were taken daily (for 13 days) from a container in which there was a population of healthy paramecium. A microscope was then used to count the number of organisms in each sample.

Table 1 Daily population count of Paramecium.

	Time (days)													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
# Paramecia	5	12	30	75	150	260	340	405	440	450	455	445	460	450

1. Graph this information and draw a best fit curve. (time on the x-axis, population on the y-axis)
2. According to the graph is the rate of population increase a constant? Explain.
3. Predict the population by the beginning of the 14th day? How did you make this prediction?
4. Explain how you can tell when the number of births first about equals the number of deaths.

Figure 1 shows a typical growth curve in a population of paramecia.

Refer to Figure 1 to answer questions 5 to 9.

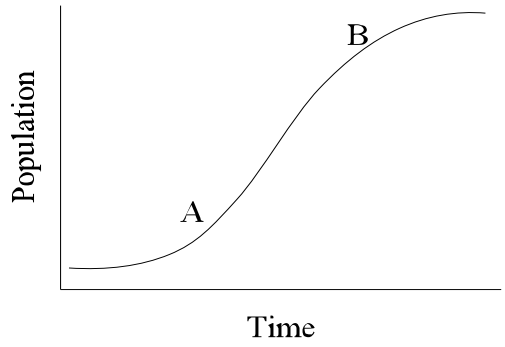

Figure 1 Population of Paramecia

5. What happened to the size of the paramecium population at the point A?
6. What happened to the population during that part of the graph between points A and B?
7. What happened to the rate of population increase from point B on?
8. What variables would cause the population curve to level off after point B?

9. Discuss the importance of the following factors in determining population growth:
   a) the presence of disease organisms
   b) the presence of wastes and poisons
   c) the amount of food and water
   d) availability of space for the organism

The environment cannot support more life than it can feed. Neither can it continue to support life if wastes and poisons become too concentrated. The greater the population, the greater the crowding. Thus, accumulation of wastes increases. Poor nutrition means a weakening of the living organisms. Thus, chances of survival are reduced. Crowding and accumulation of wastes and poisons increase the likelihood of early death of the organism through spread of disease. Eventually, because of the input and output between environment and organisms, the number of births in the population equals the number of deaths in the population.

What does this mean for the human species? Man is an organism, and the population curves for organisms seem to have a similar shape.

10. How does the curve for human population growth differ from the typical population curve in Figure 1?
11. Does the rate of human population growth seem to be leveling off?
12. Suggest some possible reasons why the world population can or cannot continue to increase indefinitely.