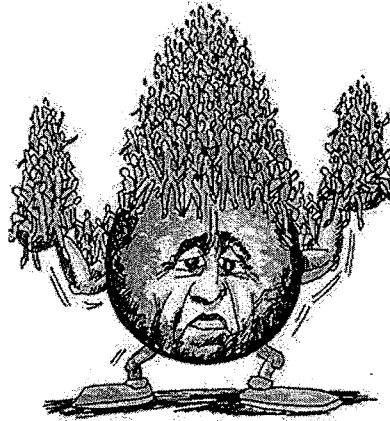


Human Population Growth



Objectives

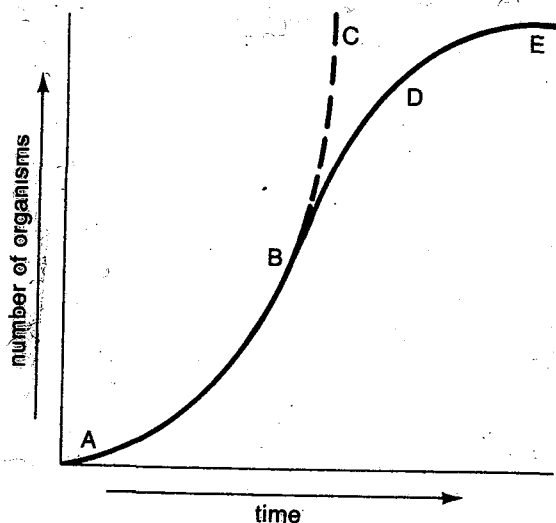
- ✓ create a graph of human population growth
- ✓ Use graph to predict future growth
- ✓ identify factors that affect population growth.

Introduction:

All populations have the potential for growth. Changes in the environment exert pressures on the growth of populations. If the environmental pressures on a population decrease, then the population will increase in size. As you already know, the maximum population that can be supported in a given environment is called the **CARRYING CAPACITY** of that environment.

LIMITING FACTORS that can alter the growth of a population include food, water, physical space, competition, predation, and disease. ***A population is considered stable and in equilibrium when the birth and death rates are equal.***

The graph below illustrates what happens to a population in response to environmental pressures:



Introduction Analysis questions (separate Paper)

1. Why is the growth rate relatively slow at Phase A?
2. The growth rate at phase B is considered to be exponential. Describe why such a growth rate would never continue to phase C in an natural ecosystem.
3. Explain what is happening in the environment to cause the change in the growth rate at point D.
4. Which phase represents the carrying capacity of the environment?

The Earth's Carrying Capacity

Prior or the 19th century, the death rate of humans was high, which kept the human population from increasing rapidly. However, the agricultural revolution increased food production and the industrial revolution improved methods of transporting food and other goods. Advances in medicine, sanitation and nutrition during the 20th century further decreased death rates and was attributed with the rapid growth rate of the human population.

As with any population, humans are also limited by factors such as space, amount of food and disease. Authorities disagree on the maximum number of people that the Earth can support, though the numbers generally range for 8 to 10 billion. As the population approaches its limit, starvation will increase. Some countries have a much higher growth rate than others.

Today, most countries recognize that something must be done to slow the growth of the human population. Some experts propose that countries should move toward ZERO POPULATION GROWTH, where the number of births equals the number of deaths. To achieve zero population growth, each couple would have only two children (to replace their parents). Even if zero population is realized and sustained, the population will continue to grow because parents will still live on for decades, as their two children, two grandchildren, and perhaps even their two great-grandchildren are born. The United States reached zero population growth in the 1980s, and yet the overall population of the US still increases.

The chart below lists human population growth from 1650 to 2011. Make a graph of the world population growth. **Remember to use pencil to make your graph!**

Please use the following guidelines in constructing your graph:

- ✓ X axis = time
- ✓ Y axis = number of people (in billions)
- ✓ Make an appropriate scale for each axis
- ✓ Plot the data points and connect them to form your graph
- ✓ **CIRCLE** the data points
- ✓ **Title** the graph
- ✓ **Once you have completed your graph, answer the analysis and conclusion questions on separate paper.**

Human Population Growth 1650-2011

Year A.D.	Number of People (in billions)
1650	.50
1750	.70
1850	1.0
1925	2.0
1956	2.5
1970	3.6
1980	4.4
1991	5.5
2000	6.0
2004	6.4
2008	6.7
2011	6.9

Analysis:

1. It took 1649 years for the world population to double, going from .25 billion people to .50 billion people. How long did it take for the population to double once again?
2. How long did it take for the population to double a third time?
3. Again, how long did it take the population to double a fourth time?
4. Based on your graph, in what year will the population reach 8 million?
5. Based on your graph, how many years will it take for the population of 2004 to double?

Conclusions:

1. What do you think is the MOST significant change that accounts for the rapid increase in human population during the last century? **Explain your answer.**
2. When a population reaches zero population growth, will the population remain in equilibrium? **Explain your answer.**
3. Describe what may happen if the human population exceeds the Earth's carrying capacity.



