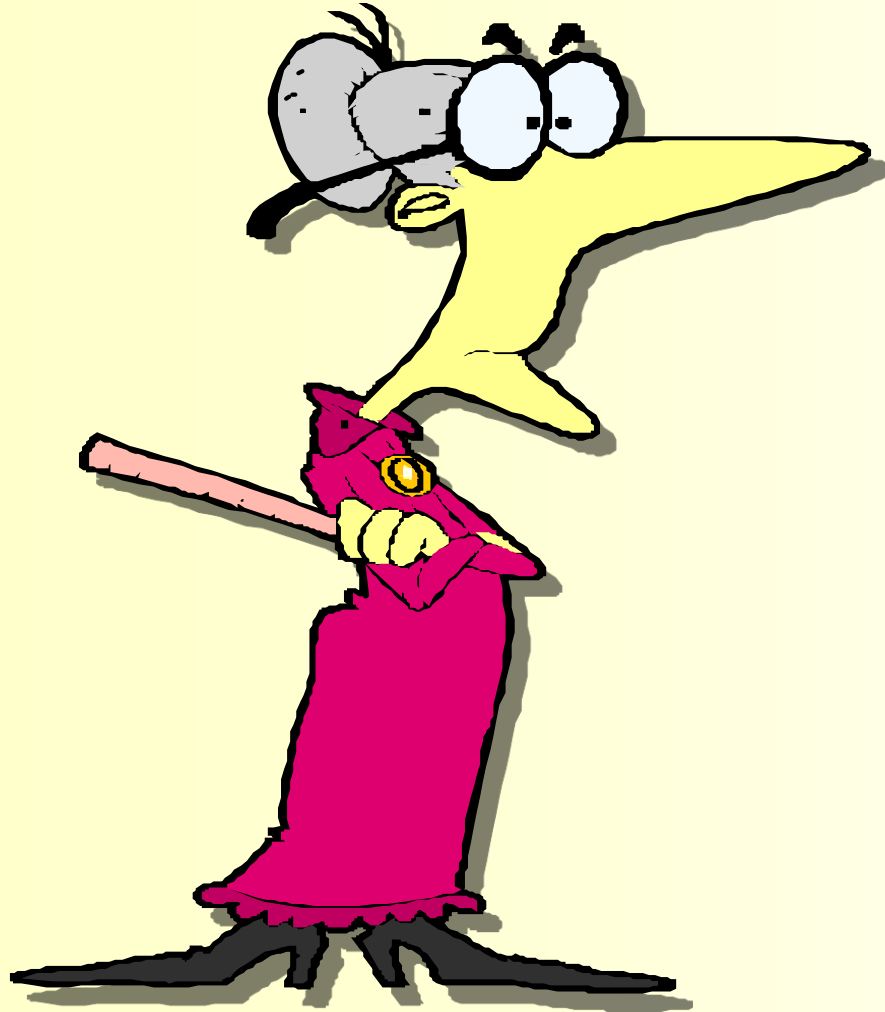




Populations

Chapter 5

Sec. 5-1 How Populations Grow

Characteristics of Populations

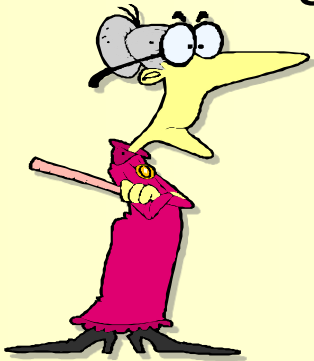
💡 Three important characteristics of a population are:

👤 geographic distribution

👤 density

👤 growth rate

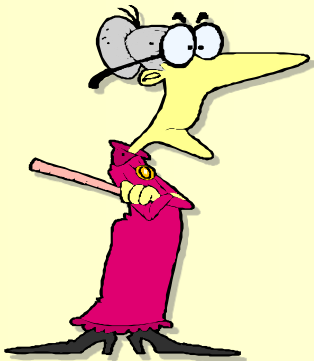
💡 Geographic distribution, or range, is the area inhabited by a population.





 Range can vary from a few cubic centimeters occupied by bacteria in a rotting apple to the millions of square kilometers occupied by migrating whales.

 Population density is the number of individuals per unit area.



Population Growth

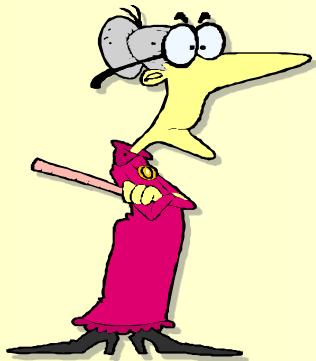
💡 Three factors can affect population size:

👤 the # of births

👤 the # of deaths

👤 the # of individuals that enter or leave the population

💡 Populations grow if more individuals are born than die in any period of time.



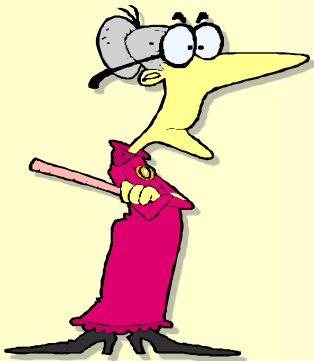
💡 Immigration is the movement of individuals into an area. (population will increase)

💡 Emigration is the movement of individuals out of an area. (population will decrease)

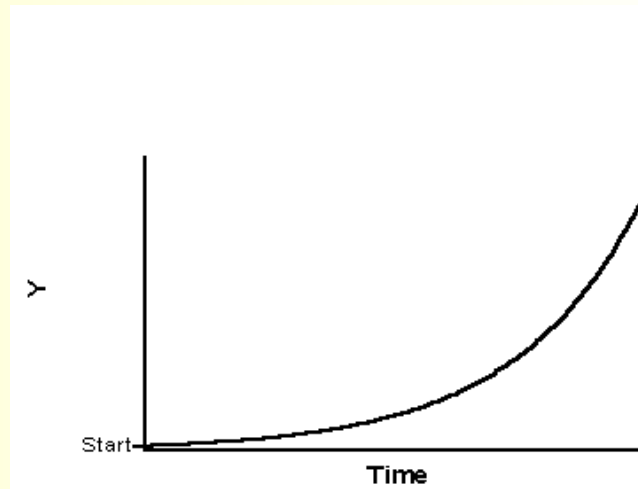
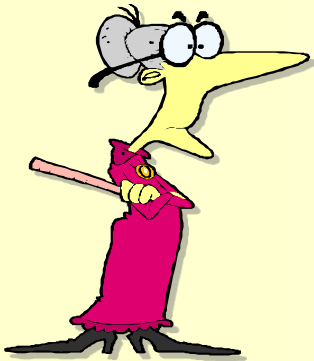
Exponential Growth

💡 If a population has abundant space and food, and is protected from predators and disease, then organisms in that population will multiply.

💡 Exponential growth occurs when the individuals in a population reproduce at a constant rate.

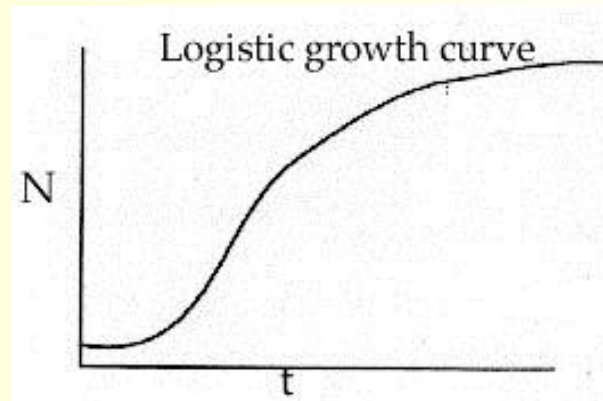
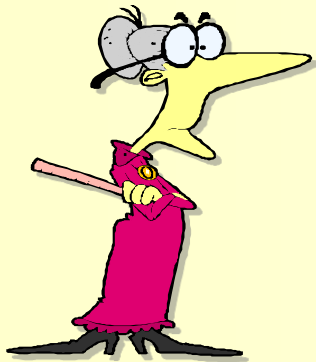


- 💡 The pattern of growth is a J-shaped curve.
- 💡 The number of individuals in an exponentially growing population increases slowly.
- 💡 Overtime, the population becomes larger and larger until it approaches an infinitely large size.



Logistic Growth

- 💡 As resources become less available, the growth of a population slows or stops.
- 💡 Logistic growth occurs when a population's growth slows or stops following a period of exponential growth.
- 💡 The pattern of growth is an S-shaped curve.



💡 Population growth may slow down when:

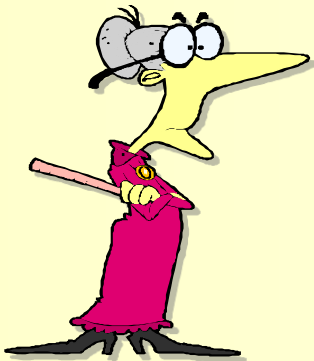
👤 the birthrate decreases

👤 the death rate increases

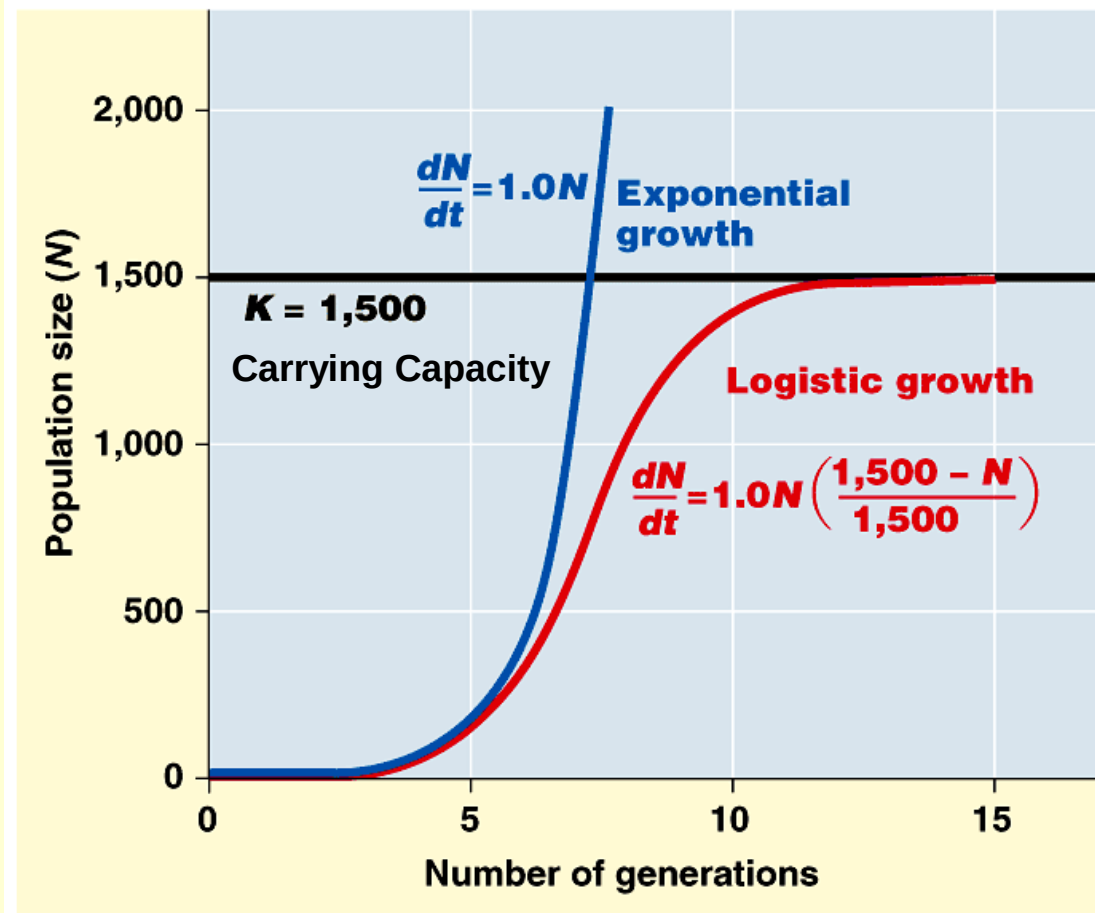
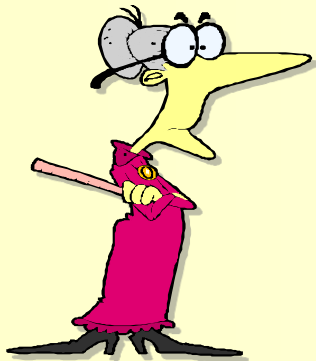
👤 both events occurs at the same time

💡 When the population has leveled off, the average growth rate has reached zero.

💡 Carrying capacity is the largest number of individuals that a given environment can support.



💡 In the natural world, most populations follow a logistic growth curve.



Limits to Growth

Section 5-2

Limiting Factors

- A limiting factor is a factor that causes population growth to decrease.
- Some limiting factors that can affect a population are:
 - Competition
 - Predation
 - Parasitism and disease
 - Drought and other extreme climates
 - Human disturbances

- A resource base that is limited can also affect the long-term survival of a species.
 - The panda population is one of the most endangered species today because pandas depend on bamboo for food and the forests are being cleared for timber and farmland.

Density-Dependent Factors

- A density-dependent limiting factor is a limiting factor that depends on population size.

- These factors operate most strongly when a population is large and dense.
- They do not affect small, scattered populations as greatly.
- Density-dependent limiting factors include:
 - Competition
 - Predation
 - Parasitism and disease

Competition

- When populations become crowded, organisms compete with one another for food, water, space, sunlight, and other essentials.

- Competition among members of the same species is a density-dependent limiting factor.
- The more individuals living in an area, the sooner they use up the available resources.
- Competition can also occur between members of different species.
- This type of competition is a major force behind evolutionary change.
- The species may evolve to occupy separate niches.
- No two species can occupy the same niche in the same place at the same time.

Predation

- A predator-prey relationship is the regulation of a population by predation.
 - Wolves and moose on Isle Royal

Parasitism and Disease

- Like predation, parasites take nourishment at the expense of their hosts, often weakening them and causing disease and death.
- So, parasites can also limit the growth of a population.

Density-Independent Factors

- Density-independent limiting factors affect all populations in similar ways, regardless of the population size.
- Density-independent limiting factors include:
 - Unusual weather (extreme hot or cold)
 - Natural disasters (storms or hurricanes)
 - Season cycles (droughts)
 - Human activities – damming rivers, clear-cutting forests

- Many species show a characteristic crash in population size.
- After the crash, the population may soon build up again, or it may stay low for some time.
- Environments are always changing, and most populations can adapt to a certain amount of change.
- Populations often grow and shrink in response to change.
- Major upsets can lead to long-term declines in certain populations.



Human Population Growth

Section 5-3

➤ *The human population is growing at a rate of nearly 3 people per second.*



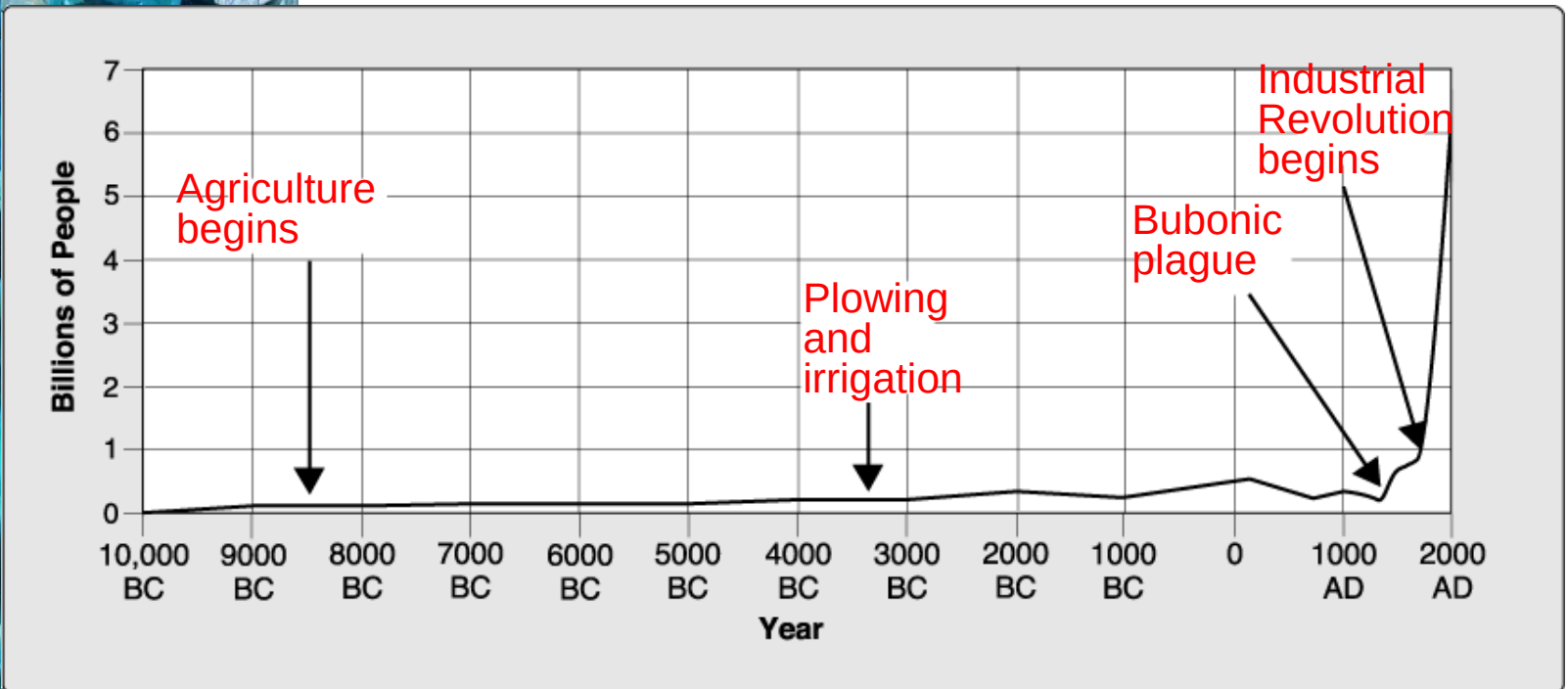
Historical Overview

- For most of human existence, the population grew slowly.
- Limiting factors kept population sizes low:
 - Life was harsh
 - Food was scarce
 - Incurable diseases were rampant



- Only half the children survived to adulthood so families had many children to make sure some would survive.
- Agriculture and industry made life easier.
- Improved sanitation, medicine and health care reduced the death rate and increased longevity.

- With these advances, the human population experienced exponential growth.





Patterns of Population Growth

- If the human population grew exponentially, resources would run out.
- Today, scientists have identified a variety of social and economic factors that can affect human populations.



- Demography is the scientific study of human populations.
- Birthrate, death rates, and the age structure of a population help predict why some countries have high growth rates while other countries grow more slowly.



The Demographic Transition

- The population growth in the US, Japan, and much of Europe has slowed dramatically.
- These countries have completed a demographic transition which is a dramatic change in birth and death rates.



- Due to advances in society, the death rate is lower thus the demographic transition has begun.
- How does this work?
 - When the death rate first begins to fall, birthrates remain high. So, population increases rapidly.
 - Happened between 1790 and 1910
 - Still happening in South America, Africa, and Asia



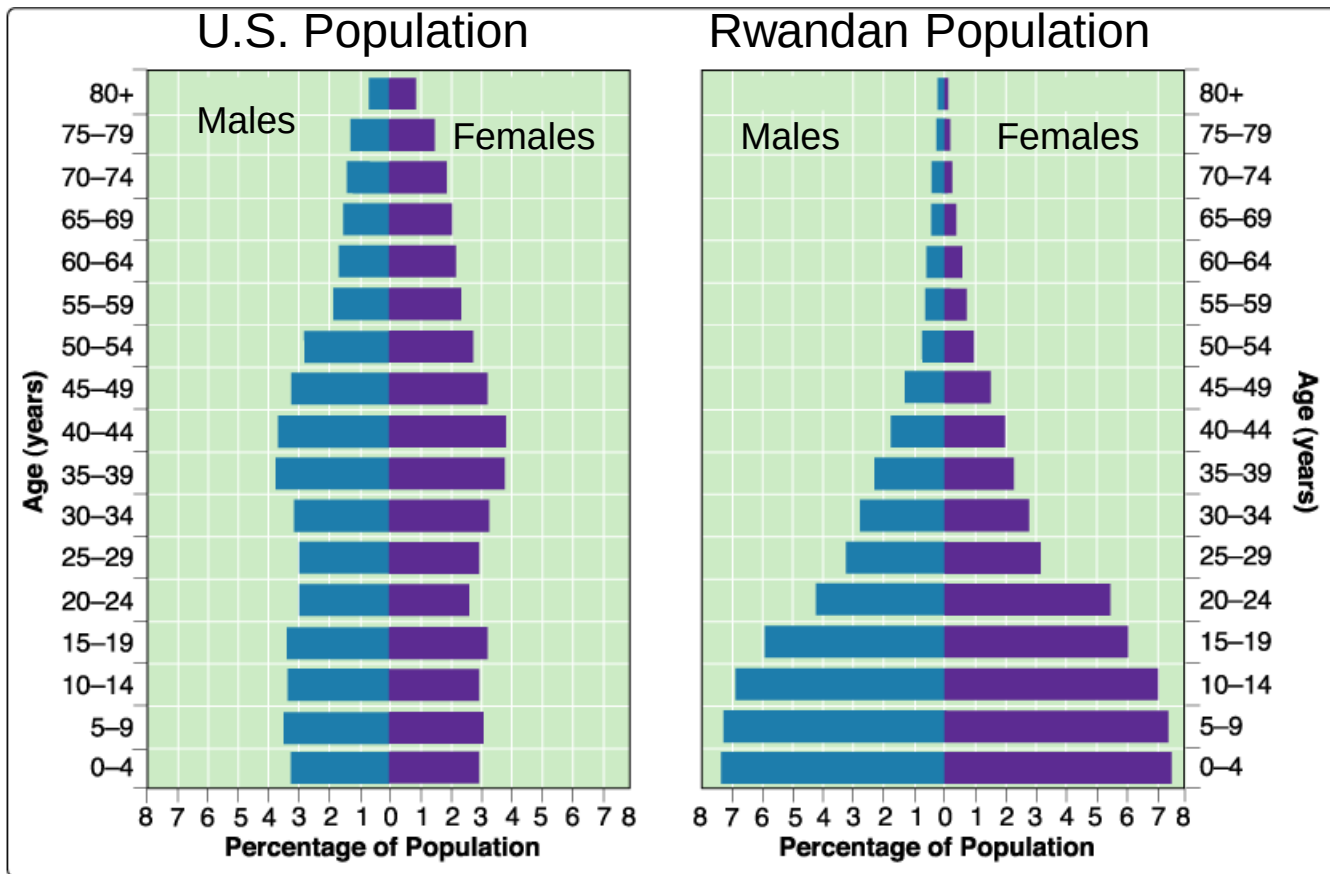
- Modernization, higher education and an increase in the standard of living, families have fewer children. So, birthrate falls.
- Demographic transition is complete when the birthrate falls to meet the death rate, and population growth stops.
- Most people live in countries that have not yet completed the demographic transition.
- India and China lead in growth along with 10 other countries.



Age Structure

- Population growth depends on how many people of different ages make up a given population.
- Age-structure diagram graphs the numbers of people in different age groups in the population.

Age-Structure Diagram





Future Population Growth

- To predict how the world's population will grow, demographers must consider many factors:
 - age structure of each country
 - prevalence of life-threatening diseases
- Current projections suggest the population will reach 9 billion in 2050.



- The growth rate may level off or even decrease if countries that are currently growing rapidly move toward demographic transition.
- In 2050, the growth rate is projected to be .43%.
- The peak growth rate of 2.19% was reached in the early 1960's.