4.1 Population Dynamics

Inside This Section...
- Linear vs. Exponential Growth
- Carrying Capacity
- Reproductive Strategies
- Limiting Factors

Logical Mathematics
- Let's calculate the number of bacteria there would be if the population were allowed to grow for 24 hours.
- Assume that there were two to start with, they divide once every 20 minutes, and none of them died.
- What factors might keep them from taking over the world?
Linear vs. Exponential Growth

Suppose you work at a some job.
You get paid $10 per hour.
How much would you have in 10 hours?

Linear vs. Exponential Growth

The initial phase of population growth is slow because the number of available organisms is _______ at first.
Soon the growth becomes very fast as the organisms _______.

Can a population of organisms grow indefinitely?

Space to grow
Availability of food
The number of organisms that an environment can support is called the ____________.
The graph of the carrying capacity is a _______.

Populations start out slow and then experience a period of _______ growth, followed by a _______ growth rate.

Populations go above the average line then fall below, only to rise above again.

Why do some populations of organisms seem to thrive at certain times of the year and then dwindle at other times?

In order to answer this question biologists study the ____________ cycles of animals.

Two extreme organisms for population growth rates are elephants and mosquitoes.

Mosquitoes are _____ reproducers over a ______ time.

Elephants are _____ reproducers over a _____ time.
The Mosquito Strategy

Mosquitoes are successful in environments that are ___________ and __________.

Organisms with this type of life-history pattern tend to:

- Be ______
- Mature ______
- Reproduce ______
- Have a _____ life span

The Elephant Strategy

Organisms that tend to live in a more ______ environment have a different life-history pattern. They tend to:

- Be ______
- Reproduce and mature ______
- Live for ____ periods of time.

Why the Different Types of Reproductive Cycles?

The type of reproductive cycle that an animal has depends on the ___________ they are in.
Section 4.1

Two Types of Limiting Factors

Density-__________
- E.g. Disease, Competition, Parasites, Food
- (effects get bigger as population size ___________)

Density-__________
- Temperature, Storms, Floods, Drought
- (effects not influenced by population size - mostly _______)

Section 4.1

Predation Affects Population

The population of the prey in a community will affect the population of the __________.
Likewise the opposite is true.
This relationship is referred to as the _______________ ____________
e.g. Lynx and Hare

Section 4.1

Competition for Resources

The more organisms you have struggling for the same resource the _____ resources there are for each individual organism.
CROWDING AND STRESS

As a population grows the amount of stress increases in a population.

Stress can cause:

- ______________
- Decrease in ________ care
- Decreased ________
- Decreased resistance to ________

Section 4.1

IN REVIEW...

- Linear vs. Exponential Growth
- Carrying Capacity
- Reproductive Strategies
- Limiting Factors

Section 4.1

Ch 4: Population Biology

4.2 - Human Population Growth
Inside This Section...

- Demography
- Growth Rate, Age Structure and Geographic Distribution

Demography

Demographics is the study of human population growth and characteristics.

Demographics are concerned with:
- __________
- __________
- __________

Demographics can be used as tools to predict future population tendencies.

Birth Rates & Death Rates

A population's growth rate is measured by finding the difference between the _____ rate and the _____ rate.

If a country’s birth rate is 38.5/1000 and its death rate is 21/1000, what is their growth rate?
Section 4.2

Doubling Time

- The amount of time that it takes for a population to ______ in size.
- DT = 70/the annual growth rate

Section 4.2

Age Structure

- Age structure refers to the proportions of a population that are at different _____ _____.
- If it is equal at different levels, this results in a _____ population.
- This is useful in making __________.

Section 4.2

Mobility

- ________: Movement of individuals into a population
- ________: Movement from a population
- Immigration and emigration has no effect on total world population, but does affect ______ growth rates. Also affects ______ populations
In Review...

- Demography
- Growth Rate, Age Structure and Geographic Distribution