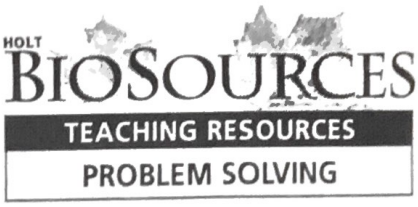
Name _____

Date _____ Class _____



6. Population Size

A population is a group of the same kind of organisms that live in the same place at the same time. The number of people living in the United States in 1997, the number of aquatic insects in a lake in 1992, the number of maple trees in a Wisconsin forest in 1997, and the number of moths in a closet on August 1, 1997, are all examples of populations. In order to describe a population, the type of organisms, the space in which they live, and the time they are living there must be specified.

Objectives

After completion of this worksheet, you will be able to calculate the rate of change of the size of a population, define the term *rate,* calculate population density, calculate rate of change in population density, and extrapolate the size of a population.

Population Size

The size of any population changes continually. A biologist measures the change in a population by counting and recording individuals from a specific area at several different times. This measure of population is expressed as numbers of individuals in a definite area at a specific time.

Population Density

To calculate the population density, divide the size of the population by the area in which the population is found. For example, the density of 400 maple trees in a 10 hectare forest is 40 maple trees per hectare.

$$\frac{\text{400 maple trees}}{\text{10 hectares}} = \text{40 maple trees per hectare}$$

Rate of Change

The change in the size of a population over a period of time is the rate of change of the population. To calculate the rate of change of a population, divide the change in the size of the population by the period of time during which the change took place. To calculate the rate of change of the density of a population, divide the change of density by the time period in which the density change occurred.

Example 1

In 1960, there were 400 maple trees in a forest in Wisconsin. Thirty-five years later, in 1995, there were 925 maple trees in the same forest. The population of maple trees increased by 525 over a 35-year period. The average rate of increase of maple trees in the forest was 15 trees per year.

925 maple trees in 1995 − 400 maple trees in 1960 = 525 more trees after 35 years

$$\frac{\text{525 trees}}{\text{35 years}} = \text{15 trees per year} = \text{Average rate of increase}$$

Example 2

On the first day of fall in 1972, a group of biologists counted 475 deer in a nature preserve. Eight years later, in 1980, the biologists counted 379 deer in the preserve on the first day of fall. The population of deer decreased by 96 deer. The average rate of decrease of deer in the nature preserve was 12 deer per year.

375 deer in 1980 − 475 deer in 1972 = −96 deer after 8 years
(96 fewer deer after 8 years)

$$\frac{-96 \text{ deer}}{8 \text{ years}} = -12 \text{ deer per year (12 fewer deer per year)} = \text{Average rate of decrease}$$

Practice Exercise

1. Which of the following describe a population? Give your reason why or why not.
   a. 100 beetles

   _____

   b. 1,738 trout in a lake in 1986

   _____

   c. The rose plants in a yard

   _____

   d. The students in your high school

   _____

   e. 1,096 caterpillars found on a tree on May 22, 1996

   _____

2. A census of marine animals along a Pacific coast beach in 1988 revealed the presence of 124 harbor seals. Six years later there were 82 harbor seals along the same section of beach. What was the rate of change of the population?

   _____

3. In 1985 a biologist counted 750 pine trees in a 250 hectare forest. Using similar counting techniques, the biologist counted 1,250 pine trees in 1990 and 1,500 pines in 1995.
   a. What was the average change of the size of the population from 1985 to 1995? _____
   b. What was the density of pine trees each year that they were counted?

   _____

   c. What was the average change of density from 1985 to 1995?

   _____