Biology Name_____

Chapter 4: Population Ecology

Population Changes

1. A team of biologists studied a population of turtles in a woodlot in Ohio for 10 years. The following data were determined in the study:
   Natality averaged 40 turtles per year
   Mortality averaged 30 turtles per year
   Immigration averaged 3 turtles per year
   Emigration averaged 8 turtles per year
   a. Was the turtle population increasing or decreasing? Explain how you determine your answer.

   b. Was the population supplying turtles to other populations or gaining individuals from surrounding populations? Explain your answer.

   c. What was the average annual net change due to immigration and emigration?

   d. If the initial population was 15 turtles, what would the population have been at the end of the 10 year study?

2. In a certain city, 1,056 humans and an estimated population of 1,400 rats lived in an 8-block area. In a renovation project, the old buildings in the area were torn down and replaced with modern apartment buildings. The area was then occupied by 2,480 humans and an estimated population of 160 rats.
   a. What was the original density of humans?

   b. What was the original density of rats?

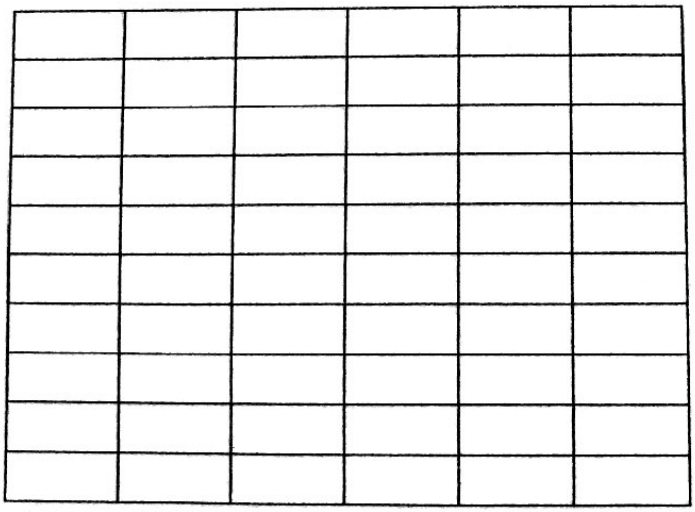
   c. What determiner of population size was most responsible for the increase in the size of the human population? Explain:

   d. Which determiners of population size were most responsible for the decrease in the rat population? Explain:

3. Imagine an island with 10 house sparrows (5 male-female pairs). Let's assume (1) Every breeding season, each pair produces 10 offspring, 5 males and 5 females. (2) Each year, before breeding, the parent birds all die. (3) All offspring survive to breed. (4) No emigration or immigration takes place.
Calculate the size of this hypothetical population at the beginning of each breeding season. In the Spring (beginning of breeding season) of 1978, there are 5 pairs of birds. Each pair produces 10 offspring and then the parents die. Thus, there are 50 birds which is made up of 25 breeding pairs. Calculate the sparrow population for the years 1978-1983. Fill-in the numbers in the chart below:

Year	Population	Females	Males	# of pairs of sparrows
1978	10	5	5	5
1979	50	25	25	25
1980	250	125	125	125
1981				
1982				
1983	31,250	15,625	15,625	15,625

Now graph the population. The Y axis will be the population size and the X axis will be the years.



Hypothetical sparrow population