

Ecology Packet

100 Points

Answer all questions on a separate paper (number each answer)

The Structure of Ecosystems (1 Point/Part)

1. Biomes
 - a. Definition
 - b. What are biotic and abiotic factors?
 - c. Name all of the terrestrial biomes
 - d. Name all of the aquatic biomes

2. Habitat
 - a. Definition
 - b. What two factors affect habitats?

3. Niche
 - a. Definition
 - b. What is the difference between a fundamental niche and a realized niche?

4. Food Chains & Food Webs
 - a. What is the main difference between a food chain and a food web?
 - b. Define trophic level
 - c. What are the five types of consumers?
 - d. Why are food chains limited to four or five trophic levels?

5. Primary Productivity
 - a. Definition
 - b. What is the difference between GPP & NPP

6. Ecological Pyramids
 - a. Compare the characteristics of a numbers pyramid, biomass pyramid, and energy pyramid.
 - b. A numbers pyramid and biomass pyramid can be inverted. Why can't an energy pyramid be inverted?

7. Biochemical Cycles
 - a. Draw pictures of the Water Cycle, Nitrogen Cycle, and Carbon Cycle. Be sure to label each **process** occurring in the picture.

Relationships within Ecosystems (1 Point/Part)

8. Competition
 - a. Definition
 - b. What is the difference between intraspecific and interspecific competition?
 - c. What is the competitive exclusion principle?
 - d. Why is intraspecific competition more intense than interspecific competition?

9. Predation
 - a. Definition
 - b. Why do predator and prey populations fluctuate in response to each other?
10. Symbiosis
 - a. Definition
 - b. What are the 3 types of symbiotic relationships?
 - c. Discuss and provide examples of each symbiotic relationship.
11. Succession
 - a. Definition
 - b. What is the difference between primary and secondary succession?
 - c. Discuss the process of succession mentioning the three phases.

Population Growth (1 Point/Part)

12. Population Growth Rate
 - a. Definition/Equation
13. Biotic Potential
 - a. Definition
 - b. In nature, do populations typically reach their biotic potential?
14. Growth Curves
 - a. Definition
 - b. What is the difference between a J-shaped curve and an S-shaped curve?
 - c. What are the two parts of a J-shaped curve?
15. Carrying Capacity (K)
 - a. Definition
 - b. What can lead to fluctuations in the carrying capacity?
16. Limiting Factors
 - a. Define
 - b. Define population density
 - c. Discuss and provide examples of density-dependent factors and density-independent factors.
17. Human Population Growth
 - a. What factors have led to the growth of the human population?
 - b. What factors must a biologist consider when making predictions about human population growth?
 - c. What are age-structure diagrams?
 - d. How is human population growth affecting our environment?

Analyzing Data: Population Trends (7 Points Each)

Do fruit flies and rabbits show similar trends in population growth?

18. Tables and Graphs

Make a graph using the data in each data table. One graph will show the growth rate of a fruit fly population. The other graph will show the growth rate of a population of rabbits.

Fruit Fly Population Growth	
Days	Number of Fruit Flies
5	10
10	50
15	100
20	200
25	300
30	310
35	320
40	320

Rabbit Population Growth	
Generations	Number of Rabbits
1	100
2	105
25	1,000
37	1,600
55	2,400
72	3,350
86	8,000
100	13,150

19. Analyzing Data

What type of growth pattern is exhibited by the fruit fly population? Is it the same type of growth as in the rabbit population? Explain.

20. Drawing Conclusions

Does either graph indicate that there is a carrying capacity for the population? If so, when does the population reach its carrying capacity? What is the maximum number of individuals that can be supported at that time?

21. Predicting

Animals such as foxes and cats often prey on rabbits. Based on the growth curve of the rabbit population, what might have happened if a group of predators moved into the rabbits' habitat during the tenth generation and began eating the rabbits?

Population Size Problems (8 Points Each)

22. Which of the following describe a population? Give your reason why or why not.

- 100 beetles
- 1,738 trout in a lake in 1986
- The rose plants in a yard
- The students in your high school
- 1,096 caterpillars found on a tree on May 22, 1996

23. 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?

24. 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 in 1995.
- What was the average change of the size of the population from 1985 to 1995?
 - What was the density of the pine trees each year that they were counted?
 - What was the average change of density from 1985 to 1995?
25. A group of wildlife biologists studied the chipmunk population in a 3,000 hectare forest from 1940 to 1995. Estimates of the size of the population (rounded off to the nearest 10) are shown in the table below.

Year	Number of chipmunks	Year	Number of chipmunks
1940	240	1970	1,570
1945	760	1975	1,390
1950	1,420	1980	630
1955	2,290	1985	350
1960	2,350	1990	720
1965	2,190	1995	1,440

- What was the population density of chipmunks in 1970?
- What was the average change in the population density from 1940 to 1985?
- What was the average change in the population from 1960 to 1985?
- A biologist thinks the population of chipmunks will be in the range of 2,900 to 3,100 in the year 2000. Is that a reasonable guess? Why or why not? It may be helpful to graph the data and use the graph to extrapolate population size.

Bonus (2 Bonus Points Each)

- What is the projected population of the United States on the day that you submit this ecology packet?
- What is the projected population of the world on the day that you submit this ecology packet?
- What percent of the world population does the US population represent?