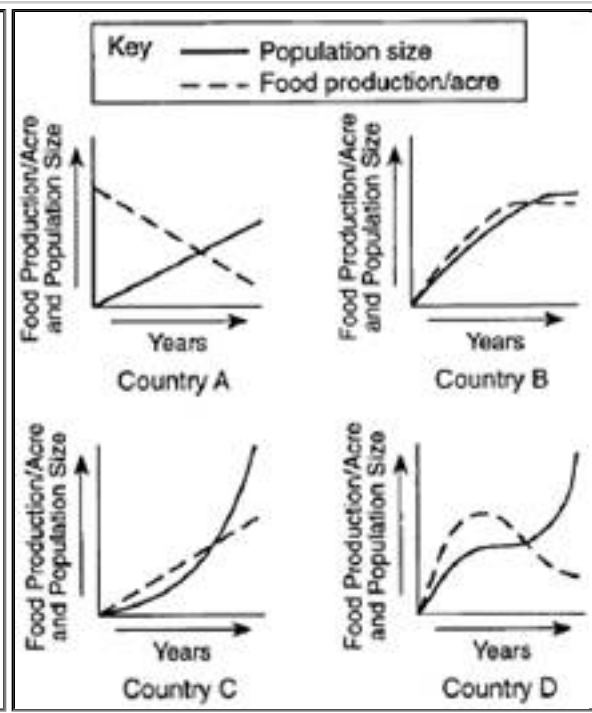


Choose the response which best completes each statement or answers each question

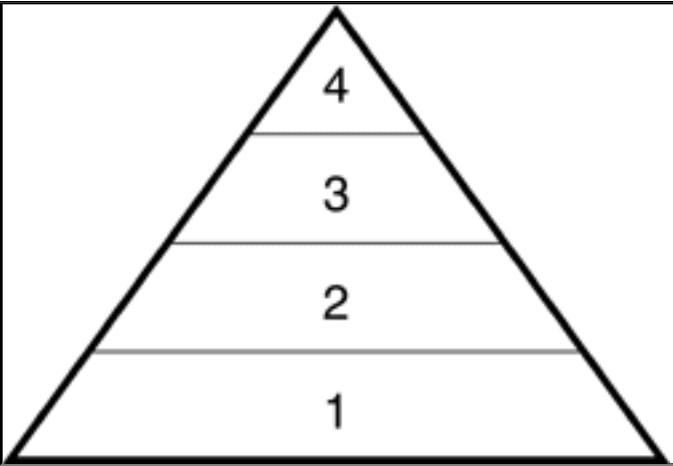
1. The use of ladybugs and praying mantises to consume insect pests in gardens is an example of (1.) use of biocides to control insect pests (2.) biological control of insect pests (3.) abiotic control of insect pests (4.) exploitation of insect pests
2. Humans often have not given much thought to the long-term impacts of technological change. As the 21st century begins, most scientists would agree that humans should (1.) develop the uninhabited parts of Earth for the human population increase (2.) learn how to control every aspect of the environment so that damage due to technology will be spread evenly (3.) use new technology to expand human influence on all natural communities (4.) use knowledge of ecology to consider the needs of future generations of humans and other species
3. Which human activity would most likely result in the addition of an organism to the endangered species list? (1.) cover cropping (2.) use of erosion controls (3.) habitat destruction (4.) use of pollution controls
4. Farmers sometimes release praying mantises into their fields to consume other insects that destroy crops. This action is an example of (1.) exploitation of wildlife (2.) technological oversight (3.) chemical control of insect pests (4.) biological control of insect pests
5. One practice that has successfully increased the number of bald eagles in the United States is the (1.) preservation of other eagle species that occupy the same niche (2.) increased use of pesticides (3.) importation of food to their nesting sites (4.) protection of their natural habitat
6. An activity that would help to ensure a suitable environment for future generations is the increased use of (1.) fossil fuels (2.) pesticides (3.) biological controls (4.) chemical dumps
7. Which activity would most likely control an insect pest and be the least harmful to the environment? (1.) spraying areas with biocides that affect the insect pest (2.) releasing imported insects that prey on the insect pest (3.) eliminating the plants that the insect pest feeds on (4.) using traps baited with sex hormones to attract the insect pest

8. The graphs at the right show the size of the human population in relation to food production per acre in four different countries over the same period. Which country survived the longest without the need for food imports? (1) A (2.) B (3.) C (4.) D



9. The creation of wildlife refuges and the enforcement of game laws are conservation measures that promote increased (1.) exploitation of species (2.) preservation of species (3.) use of biological controls (4.) use of biocides

10. In which level of the would the greatest concentration of pesticides be found in the tissues of an organism? (1.) 1 (2.) 2 (3.) 3 (4.) 4



11. How long did it take in human history for the population to reach 1 billion persons (1.) 90% of human history (2.) until 1975 (3.) it happened when animals were tamed and plants were cultivated (4.) before the bubonic plague struck

12. The growth of the human population

- (1.) is the result of our ability to reduce deaths from predators and improvements in medicine
- (2.) has resulted in an improved use of resources
- (3.) improves the probability that the species will survive
- (4.) all of the above
- (5.) both A and B, but not C

13. Which would NOT be considered a renewable resource

- (1.) coal (2.) solar power (3.) ocean waves (4.) hydroelectric power

14. Ozone

- (1.) is a mineral found in the soil that is known to cause cancer
- (2.) is a gas that shields the earth from ultraviolet radiation
- (3.) is a heavy metal found in polluted water that causes death due to biological magnification
- (4.) is the reason eutrophication of lakes and ponds is a matter of serious environmental concern

15. Solving the problem of human overpopulation will probably require

- (1.) additional increases in the carrying capacity
- (2.) additional improvements in the use of natural resources
- (3.) improvements in the information about and access to procedures about birth control
- (4.) all of the above
- (5.) both A and B, but not C

16. There is ample evidence to suggest a direct relationship between global warming and increased (1.) ozone concentration (2.) carbon dioxide concentration (3.) acid rain (4.) CFC's

17. Which is NOT an expected effect of global warming? (1.) Melting of polar ice caps. (2.) Flooding of coastal areas. (3.) Increased crop yields. (4.) Alteration of rainfall patterns.

18. Which acid makes up about 2/3 of acid precipitation? (1.) chromic acid (2.) nitric acid (3.) carboxylic acid (4.) sulfuric acid

19. Which is a major source of acid precipitation? (1.) coal burning power plants (2.) sulfur dioxide in coal (3.) nitrogen dioxide in gasoline (4.) all of these

20. What does the ozone shield in our stratosphere protect us from? (1.) Superman

(2.) CFC's (3.) global warming (4.) acid precipitation (5.) UV light

21. Which substance is the major cause of the loss of our stratospheric ozone shield?  
(1.) kryptonite (2.) CFC's (3.) oxygen (4.) acid rain (5.) carbon dioxide
22. The industrial source of chlorofluorocarbons in our atmosphere is (1.) refrigerants  
(2.) plastics (3.) cosmetics (4.) all of these
23. Cultivated populations of plants and animals are different from wild populations in which of the following ways? (1.) They are highly adaptable to changing environmental conditions. (2.) They have numerous traits for resistance to parasites. (3.) They have a low degree of genetic diversity in their gene pools. (4.) They represent a reservoir of genetic materials called a genetic bank.
24. Agriculture in which one raises only enough food for one's own family is called (1.) polyculture (2.) subsistence agriculture (3.) collective farming (4.) industrial development.

For questions 25 through 31 match each term in column A with the correct match for it in column B.

#### Column A

- \_\_\_\_\_ 25. People moving into a country
- \_\_\_\_\_ 26. Way of obtaining food that allowed the human population to begin increasing exponentially.
- \_\_\_\_\_ 27. Maximum growth rate of a population
- \_\_\_\_\_ 28. How humans obtained food most of their history
- \_\_\_\_\_ 29. People moving out of a country
- \_\_\_\_\_ 30. A component of family planning opposed by some cultures and religions
- \_\_\_\_\_ 31. Maximum population that an ecosystem can support for a long time

[Column B]

- a. immigrants
- b. biotic potential
- c. farming
- d. J-curve
- e. emigrants
- f. hunting and gathering
- g. birth control
- h. S-curve
- i. carrying capacity
- j. demographic transition

32. What always happens when a population exceeds its carrying capacity?

- (1.) They obtain little red wagons to do their excess carrying.
- (2.) They are expelled from the volleyball team.
- (3.) The environment can no longer support the population for long.
- (4.) The birth rates increase while the death rates decrease.

33. In what parts of the world is population growing fastest?

- (1.) Developing countries with a high percentage of young people.
- (2.) Formerly communist countries
- (3.) Highly industrialized countries with a high standard of living
- (4.) Western Europe and the United States

34. Which would be most likely to lead to an increase in waterborne diseases? (1.) Production of sufficient firewood

- (2.) Adequate sewage treatment facilities for growing populations
- (3.) Very rapid growth of large cities
- (4.) All of these factors would lead to an increase in waterborne diseases

35. When did the agricultural revolution, with the introduction of some mechanization occur in the United States? (1.) about 1 million years ago

- (2.) about 10,000 years ago
- (3.) about 1,000 years ago
- (4.) in the mid and late 1800's

36. The creation of wildlife refuges and the enforcement of game laws are conservation measures that promote increased (1.) exploitation of species (2.) use of biological controls

(3.) preservation of species (4.) use of biocides

37. In the Coachella Valley in California, much of the desert has been converted into golf courses, housing developments, and hotels. The habitat of the Coachella Valley fringe-toed lizard is rapidly being lost. This lizard is adapted for life on fine, windblown sand. Environmentalists want to save the lizard, and developers want to continue construction. Which solution would be of most benefit to all involved?
- (1.) The fringe-toed lizards should be crossed with a species adapted for survival in a different habitat.
  - (2.) Land in the Coachella Valley should be purchased and set aside as a preserve for the lizards.
  - (3.) The land should be developed as planned and the lizards monitored to see if they can adapt to the new conditions.
  - (4.) The land should be developed as planned and the lizards relocated to another valley.
38. The use of ladybugs and praying mantises to consume insect pests in gardens is an example of (1.) exploitation of insect pests (2.) abiotic control of insect pests (3.) use of biocides to control insect pests (4.) biological control of insect pests
39. In New York State, organizations like The Nature Conservancy have bought many hundreds of acres of wetlands in order (1.) prevent erosion in forests (2.) encourage biological control of pests (3.) make the land suitable for farming (4.) preserve plant and animal habitats
40. Many governments are limiting the use of toxic pesticides and enforcing stricter hunting and fishing laws. These efforts are attempts to (1.) increase importation of organisms (2.) produce nonbiodegradable pollutants (3.) develop new farming techniques (4.) prevent species extinction

Use the following reading passage and your knowledge of the living environment to answer questions 41 and 42 which follow.

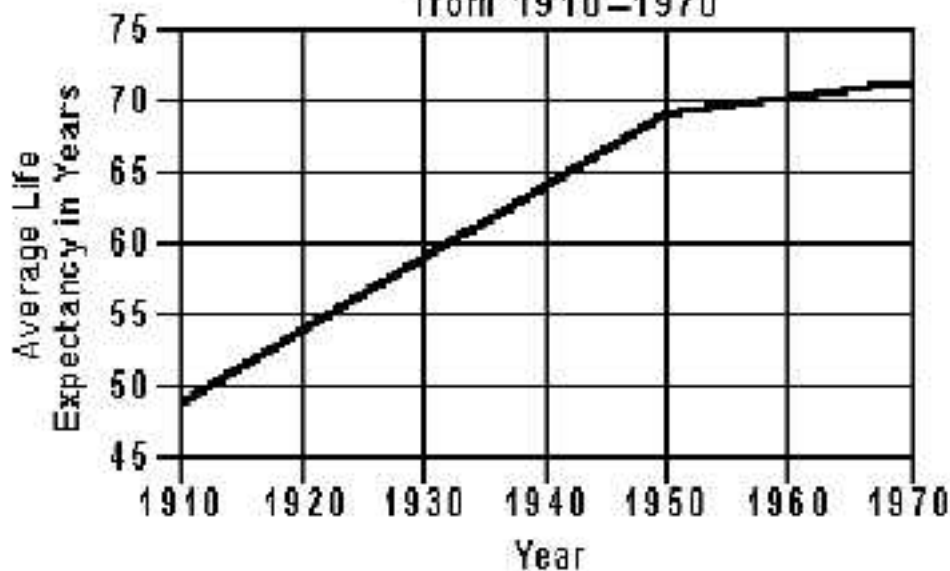
### **GET THE LEAD OUT**

Researchers have recently determined that children scored better in intelligence tests after the amount of lead in their blood was reduced. This study offers hope that the effects of lead poisoning can be reversed. Lead poisoning can cause mental retardation, learning disabilities, stunted growth, hearing loss, and behavior problems. Scientists estimate that at least 3 million children in the United States have lead concentrations above the danger

level of 10 micrograms per deciliter blood. Researchers found an average increase of one point on an index scale for intelligence for every decrease of 3 micrograms per deciliter blood concentration. A common source of lead poisoning is peeling or chipping paint in buildings constructed before 1960. Also, soil near heavily traveled roads may have been contaminated by the exhaust from older cars burning leaded gasoline. In a recent related study, another group of researchers concluded that removing lead contaminated soil does not reduce blood lead levels enough to justify its cost. The children in the study began with blood levels 7 to 24 micrograms per deciliter. Replacing the lead contaminated soil resulted in a reduction in blood lead levels of 0.8 to 1.6 micrograms per deciliter in 152 children under the age of 4. These studies are not conclusive. Results indicate a need for further studies to determine if reducing environmental lead levels will significantly reduce lead levels in the blood.

41. One effect of lead poisoning is (1.) a decrease in learning problems  
(2.) a decrease in platelet numbers (3.) an increase in behavior problems  
(4.) an increase in growth
42. A decrease of 9 micrograms per deciliter in blood lead level would most likely lead to an average (1.) decrease of six points on an index scale for intelligence  
(2.) increase of three points on an index scale for intelligence (3.) increase of one point on an index scale for intelligence (4.) decrease of three points on an index scale for intelligence
43. Using one or more complete sentences, state one practice could be used to reduce lead in the home environment
44. The graph below shows data on the average life expectancy of humans.

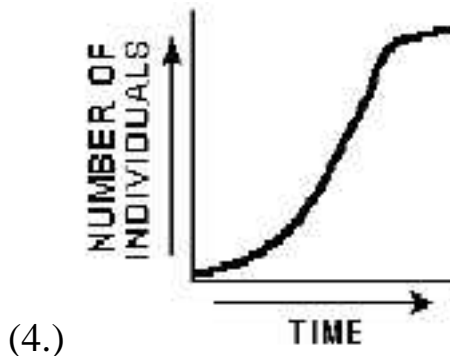
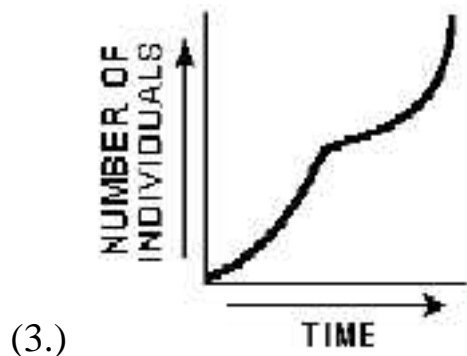
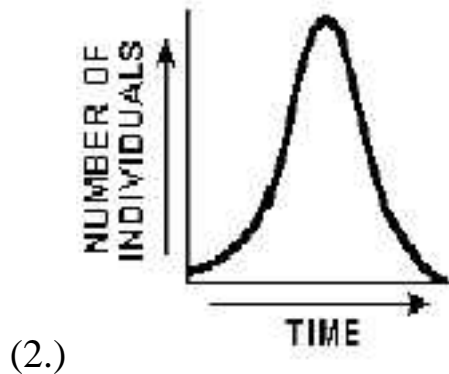
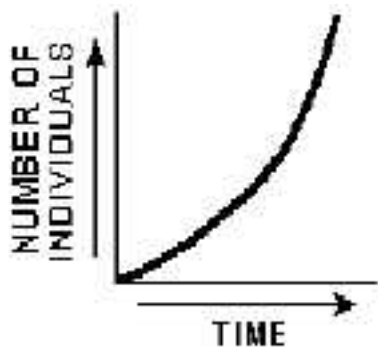
Changes in Average Life Expectancy  
from 1910-1970



The change in life expectancy is most likely the result of

- (1.) technological oversights that have had an impact on air quality
- (2.) widespread use of biocides such as DDT in water supplies
- (3.) a decrease in natural checks such as disease on the population
- (4.) poor land-use management that has affected the quality of topsoil

45. Which graph would best illustrate successful population control in humans?



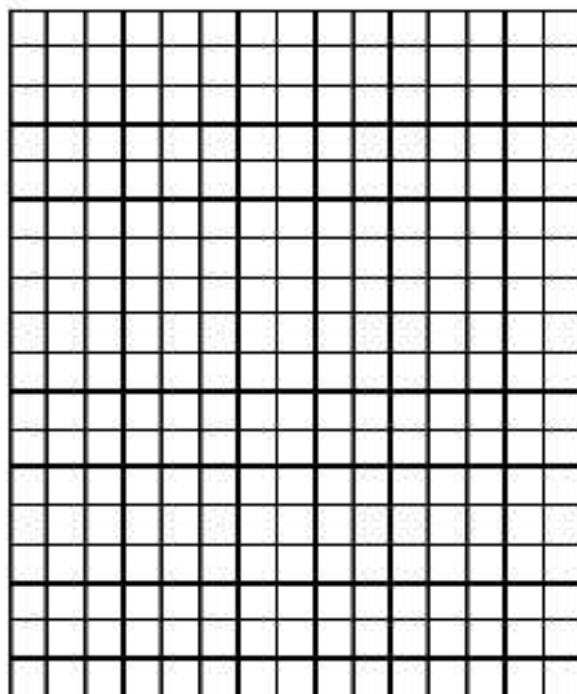
Use the information provided below and your knowledge of the living environment to answer questions 46 which is a four part question that follows.

A student placed 10 protozoans of species A and 10 protozoans of species B together in a culture medium. The student counted the number of each species for several days and recorded the results in the data table below.

DATA TABLE:

| Day | Number of Species A | Number of Species B |
|-----|---------------------|---------------------|
| 1   | 10                  | 10                  |
| 2   | 50                  | 15                  |
| 3   | 160                 | 50                  |
| 4   | 40                  | 100                 |
| 5   | 0                   | 75                  |
| 6   | 0                   | 0                   |

Number of Organisms



Time (days)

46. Using the information in the data table, construct a line graph on the grid, following the directions below.

(a.) Mark an appropriate scale on each labeled axis.

(b.) Plot the data for species A on the grid. Surround each point with a small circle and connect the points.

Example:



(c.) Plot the data for species B on the grid. Surround each point with a small circle and connect the points.

Example:



(d.) Using one or more complete sentences, state a possible reason for the decrease in the population of species B between days 1 and 6

47. A desired outcome derived from an understanding of the principles of ecology would be  
 (1.) the elimination of most predatory species (2.) an increase in world human population  
 (3.) the increased use of pesticides in agriculture  
 (4.) a decrease in disruptions of existing wildlife habitats

Use the information below and your knowledge of the living environment to answer questions 48 and 49 which follow.

A field study was conducted to observe a deer population in a given region over time. The deer were counted at different intervals over a period of 40 years. During this period of time, both ranching and hunting increased in the study region. A summary of the data is presented in the table below.

**DATA TABLE:**

| Year | Deer Population (thousands) |
|------|-----------------------------|
| 1900 | 3.0                         |
| 1910 | 9.5                         |
| 1920 | 65.0                        |
| 1924 | 100.0                       |
| 1926 | 40.0                        |
| 1930 | 25.0                        |
| 1940 | 10.0                        |

48. During which 10 year period did the greatest increase in the deer population occur?  
 (1.) 1900-1910 (2.) 1930-1940 (3.) 1910-1920 (4.) 1920-1930
49. Using one or more complete sentences, state one possible action that could have been used to help maintain a more stable population of deer in the area.
50. In an attempt to prevent certain species from becoming extinct, humans have  
 (1.) attempted to mate organisms from different species to create new and

stronger organisms (2.) put all endangered species in zoos (3.) increased the trapping of predators (4.) increased wildlife management and habitat protection

51. Gypsy moth infestations of rural areas of New York State may pose a potentially serious threat to many forested areas. Which would probably be the most ecologically sound method of gypsy moth control? (1.) increased application of DDT (2.) introduction of a biological control (3.) removal of its forest habitat (4.) contamination of its food source
52. *Bacillus popilliae* is a bacterium which causes "milky disease" in the Japanese beetle. Using *Bacillus popilliae* to decrease a Japanese beetle population is an example of (1.) abiotic control of insect pests (2.) use of biological control of insect pests (3.) use of artificial pesticides (4.) destruction of the abiotic environment
53. Endangered peregrine falcons have been bred in captivity and released in areas where pigeons and rodents are abundant. This activity is an example of (1.) species preservation and use of biocides (2.) species preservation and biological control (3.) conservation of resources and exploitation (4.) overhunting and biological control
54. Recent studies have found traces of the insecticide DDT accumulated in human fat tissue. A correct explanation for this accumulation is that (1.) fat tissue cells secrete DDT (2.) DDT is needed for proper metabolic functioning (3.) fat tissue absorbs DDT directly from the air (4.) DDT is passed along food chains
55. The most serious consequences of cutting down forests and overgrazing land is (1.) the prevention of flooding (2.) an increase in the chance of fire (3.) the loss of topsoil (4.) an increase in the number of predators
56. Recent evidence indicates that lakes in large areas of New York State are being affected by acid rain. The major effect of acid rain in the lakes is (1.) an increase in the game fish population levels (2.) the stimulation of a rapid rate of evolution (3.) the elimination of many species of aquatic life (4.) an increase in agricultural productivity
57. The rapid rise of the human population level over the past few hundred years has been due mainly to (1.) increasing resistance levels of insect species (2.) increasing levels of air and water pollution (3.) removal of natural checks on population control (4.) loss of topsoil from our farmable lands
58. Humans have been responsible for some of the negative changes that occur in nature

because they (1.) have passed laws to preserve the environment (2.) are able to conserve scarce resources (3.) are able to modify their physical environment (4.) have controlled the use of chemical biocides

59. Which illustrates the human population's increased understanding and concern for ecological interrelationships? (1.) importing organisms in order to disrupt existing ecosystems (2.) allowing air to be polluted only by those industries that promote technology (3.) developing animal game laws in order to limit the number of organisms that may be killed each year (4.) removing natural resources from the Earth at a rate equal to or greater than the needs of an increasing population
60. Which human activity is quite often responsible for the other three human activities? (1.) increasing air pollution (2.) increasing demand on limited food production (3.) rapid increase of loss of farmland due to soil erosion (4.) rapid increase of the human population
61. The presence of microcontaminants such as PCB's in a water supply is an example of a negative way in which humans have modified their environment by (1.) importation (2.) pollution controls (3.) technological oversight (4.) overcropping
62. Which is a harmful effect of microcontaminants on an aquatic ecosystem? (1.) They accumulate in certain organisms making them toxic to other organisms. (2.) They decrease the density of the water. (3.) They make the water appear cloudy. (4.) They cause water used for human consumption to have an unpleasant taste.
63. A poor land use practice that usually leads to the loss of soil nutrients is (1.) reforestation (2.) overcropping (3.) sewage control (4.) recycling
64. Which activities most directly control erosion? (1.) use of reforestation and cover cropping (2.) establishment of wildlife refuges and national parks (3.) use of phosphates and hydrocarbons (4.) establishment of game laws and fisheries
65. Which pollutant is produced by the burning of coal and oil and can result in the production of acid rain? (1.) lead (2.) sulfur dioxide (3.) phosphate (4.) hydrogen chloride
66. If excessive amounts of hot water are discharged into the lake, the immediate result will most likely be (1.) a decrease in the amount of dissolved oxygen in the lake (2.) an increase in the amount of PCB pollution in the lake (3.) a decrease in the amount of phosphates in the lake (4.) an increase in the sewage content of the lake

67. African elephant tusks consist of high quality ivory. In recent years, the elephant population in certain African wildlife preserves has decreased. This decrease is likely due to (1.) importation of Japanese beetles (2.) air pollution (3.) biocide use (4.) poachers and other exploitation of humans
68. The lower part of the Hudson River contains large amounts of polychlorinated biphenyls (PCB's) and heavy metals. Which statement best explains their presence in the river? (1.) They are introduced by environmentalists to kill sewage bacteria. (2.) They were accidentally spilled into the river by fishermen. (3.) They were discharged into the river as manufacturing by-products. (4.) They are the decomposition products of river organisms.
69. Which activity has had the most negative effect on the environment? (1.) control of air pollution (2.) importation of the gypsy moth (3.) recycling of aluminum cans (4.) biological control of insect pests
70. As human population densities in a region increase, the negative effect of humans on their environment in this region usually tends to (1.) increase (2.) decrease (3.) remain the same

### **Free Response Questions**

1. List and briefly explain (a sentence or two for each factor) two factors leading to the exponential explosion in human population growth during the past 200 years.

Use the reading passage below and your knowledge of the living environment to answer the following question.

### **PLANT PREFERENCES IN THE EDITH'S CHECKERSPOT BUTTERFLY**

2. Butterflies seem extremely fragile and beautiful. However, one species that inhabits the meadows of California and Nevada is surprisingly tough. The Edith's Checkerspot butterfly has adapted to the invasion of a weed, *Plantago lanceolata*, into its habitat. This weed species was unknowingly introduced into nearby fields by cattle ranchers. Within 10 years, this species of butterfly has changed its customary diet and reproductive site from a spindly native plant, *Collinsia parviflora*, to the invading weed. The female butterfly identifies the preferred plant by "tasting," using special cells located at the ends of her legs. If a plant passes the taste test, she her eggs on the plant. The larvae hatch and feed on the leaves until they are ready to pupate. In 1983, the butterflies laid about 80 percent of their eggs on *Collinsia* plants. Scientists have determined

that the butterflies lay about 70 percent of their eggs on the invading *Plantago* weed. Field observations indicate that Checkerspot butterflies prefer *Plantago* not just laying their eggs on the first plant they land on. Laboratory experiments have shown that plant preference is genetic, and a female deposits her eggs on a particular species of plant, the next generation will tend to do the same. The evolution of this plant preference has been extremely rapid within only seven generations of butterflies.

Using one or more complete sentences, describe the change that occurred in the habitat of the Edith's Checkerspot butterfly as a result of human activity.

3. In New York State, a certain lake was known to contain a number of fish of many species. Following a series of rainstorms that had blown in from industrial centers west lake, many of the fish died. There was no industrial, commercial, residential, or agricultural development on the lake. Using one or more complete sentences, state a valid for the death of the fish.
4. Many rivers in the United States, such as the Mississippi have a lot of pollution that enters them from adjacent farmlands. Why should people that catch and eat fish from these polluted rivers be concerned?
5. In St. Lawrence County of Northern New York, the deer population has increased to numbers which pose problems for humans. List 2 problems which these residents suffer due to the great increase in numbers in the deer population.
6. List at least two harmful effects of ozone depletion on humans
7. List two harmful effects building a shopping mall in a forested area near a village may have on the environment.