

CHAPTER 5--BIODIVERSITY, SPECIES INTERACTIONS, AND POPULATION CONTROL

Student: _____

1. What was the primary reason the southern sea otter nearly went extinct by the early 1900s?
 - A. They scared the tourists
 - B. They have thick, luxurious fur.
 - C. They were ruining the kelp beds
 - D. They were eating all the shellfish
 - E. They raided valuable bird nests
2. The primary reason why southern sea otter recovery is important is
 - A. They are cute
 - B. They are a keystone species
 - C. They encourage tourism
 - D. It is unethical to cause their extinction
 - E. They have luxurious, thick fur
3. Which of the following is the most common interaction between species?
 - A. competition
 - B. predation
 - C. parasitism
 - D. mutualism
 - E. commensalism
4. If multiple species find themselves competing for the same resource, the competition can be reduced by which of the following?
 - A. camouflage
 - B. cooperation
 - C. resource partitioning
 - D. resource expansion
 - E. mimicry

5. Which of the following is said to occur when an interaction benefits one species but has little, if any, effect on the other?
- A. interspecific competition
 - B. predation
 - C. parasitism
 - D. mutualism
 - E. commensalism
6. Which of the following is said to occur when members of two or more species interact to gain access to the same limited resources?
- A. interspecific competition
 - B. predation
 - C. parasitism
 - D. mutualism
 - E. commensalism
7. Which of the following is said to occur when one organism feeds on another organism by living on or in the other organism?
- A. interspecific competition
 - B. predation
 - C. parasitism
 - D. mutualism
 - E. commensalism
8. Which of the following would *not* be considered predators?
- A. omnivores
 - B. herbivores
 - C. detritivores
 - D. carnivores
 - E. All of these are predators.
9. Which of the following is *not* a method predators use to capture prey?
- A. pursuit
 - B. ambush
 - C. camouflage
 - D. chemical warfare
 - E. protective shells

10. Which of the following is *not* a method prey species use to avoid capture?
- A. highly developed sense of sight or smell
 - B. spines and thorns
 - C. chemical warfare
 - D. ambush
 - E. camouflage
11. Parasites
- A. rarely kill their hosts
 - B. are usually larger than their hosts
 - C. must be internal to their hosts
 - D. may strengthen their hosts over a long period of time
 - E. are usually microscopic
12. The non-poisonous ____ butterfly gains protection by looking like the bad-tasting ____ butterfly, which is a protective device known as ____.
- A. monarch; viceroy; camouflage
 - B. monarch; zebra swallowtail; camouflage
 - C. viceroy; zebra swallowtail; mimicry
 - D. viceroy; monarch; mimicry
 - E. viceroy; monarch; camouflage
13. When populations of two different species interact over long periods of time, changes in the gene pool of one species can lead to changes in the gene pool of the other. This is called
- A. competition
 - B. coevolution
 - C. coincidence
 - D. commensalism
 - E. predation
14. The relationship between clownfish and sea anemone is
- A. interspecific competition
 - B. predation
 - C. parasitism
 - D. mutualism
 - E. commensalism

15. Plants such as bromeliads share a commensalism interaction with large trees in tropical and subtropical forests. The bromeliads are an example of
- A. parasites
 - B. opportunistic parasites
 - C. epiphytes
 - D. prey
 - E. herbivores
16. All of the following are forms of nondestructive behavior between species *except*
- A. reducing competition by foraging at different times
 - B. reducing competition by foraging in different places
 - C. orchids attached to branches of forest trees
 - D. using the energy or body of another organisms as a food source
 - E. bacteria breaking down food for a host and having a sheltered habitat
17. Kelp forests are a very important ecosystem in marine waters by supporting important biodiversity. These kelp forests are threatened by all of the following *except*
- A. water pollution containing herbicides
 - B. sea urchins
 - C. southern sea otters
 - D. global warming
 - E. water pollution containing fertilizers
18. Species can, over a long period of time, develop adaptations that allow them to reduce or avoid competition by sharing resources. This is called
- A. competitive exclusion principle
 - B. resource partitioning
 - C. population distribution
 - D. interspecific competition
 - E. mimicry
19. Population size is determined by which of the following?
- A. emigration
 - B. deaths
 - C. immigration
 - D. births
 - E. all of these

20. A group of interbreeding individuals of the same species in the same geographic region is called a(n)
- A. community
 - B. population
 - C. ecosystem
 - D. biosphere
 - E. biome
21. The most common distribution of populations is which of the following?
- A. random
 - B. uniform
 - C. clumped
 - D. circles
 - E. none of these
22. Emigration is
- A. the one-way movement of individuals into an established population
 - B. the one-way movement of individuals out of an uninhabited area
 - C. the one-way movement of individuals out of a population to another area
 - D. the repeated movement into and out of an area
 - E. the lack of immigration into an area
23. Which of the following is *not* a limiting factor for populations in aquatic life zones?
- A. temperature
 - B. sunlight
 - C. nutrient availability
 - D. precipitation
 - E. dissolved oxygen
24. Which of the following is *not* one of the age structure categories?
- A. postreproductive
 - B. prereproductive
 - C. reproductive
 - D. nonreproductive
 - E. All of these answers are categories.
25. Which of the following has caused the population of the southern sea otters to fluctuate?
- A. rise in population of orcas
 - B. parasites from house cats
 - C. thorny-headed worms from seabirds
 - D. human pollution
 - E. all of these

26. "The maximum population of a given species that a particular habitat can sustain indefinitely without being degraded" is the definition of
- A. logistic growth
 - B. environmental resistance
 - C. exponential growth
 - D. carrying capacity
 - E. biotic potential
27. Exponential growth followed by a steady decrease in population growth until the population size levels off is typical of
- A. logistic growth
 - B. environmental resistance
 - C. exponential growth
 - D. carrying capacity
 - E. biotic potential
28. When plotting the number of individuals in a population against time the data yield a J-shaped curve, which indicates which of the following?
- A. logistic growth
 - B. environmental resistance
 - C. exponential growth
 - D. carrying capacity
 - E. biotic potential
29. Which of the following would cause a population to overshoot its carrying capacity?
- A. an increase in predators
 - B. a decrease in birth rates
 - C. an increase in emigration
 - D. a decrease in environmental pressures
 - E. a reproductive time lag between birth and death rates
30. Which of the following is *not* a general type of population change?
- A. stable
 - B. irruptive
 - C. cyclic
 - D. regular
 - E. irregular

31. Which of the following is an example of a density-independent population control?
- A. infectious disease
 - B. habitat destruction
 - C. parasitism
 - D. predation
 - E. competition for resources
32. Which of the following is an example of a density-dependent population control?
- A. habitat destruction
 - B. fire
 - C. pollution
 - D. floods
 - E. competition for resources
33. Some species experience an explosion of population growth to a high peak followed by a crash to a more stable lower level. This is called which of the following?
- A. stable
 - B. irruptive
 - C. cyclic
 - D. irregular
 - E. regular
34. Which of the following would exhibit primary succession?
- A. a rock exposed by a retreating glacier
 - B. an abandoned farm
 - C. a clear-cut forest
 - D. newly flooded land
 - E. a recently burned forest
35. Which of the following exhibits secondary ecological succession?
- A. abandoned parking lot
 - B. newly cooled lava
 - C. newly constructed reservoir
 - D. a crumbled concrete building
 - E. recently flooded land
36. Which of the following refers to the ability of a living system to be restored after a period of moderate to severe disturbance?
- A. stability
 - B. inertia
 - C. constancy
 - D. tipping point
 - E. resilience

37. The ability of a living system to survive moderate disturbances is called
- A. stability
 - B. inertia
 - C. constancy
 - D. tipping point
 - E. resilience
38. Late successional plants are largely unaffected by plants at earlier stages of succession, a factor called
- A. facilitation
 - B. imperturbability
 - C. inhibition
 - D. tolerance
 - E. intolerance
39. If the resilience of a damaged area is low enough, the degraded area may not be restored by secondary succession. When this happens, the damaged area has reached
- A. stability
 - B. inertia
 - C. constancy
 - D. a tipping point
 - E. resilience
40. The southern sea otter is a tool-using mammal.
- True False
41. The most common interaction between species is commensalism.
- True False
42. Humans compete with many other species for space, food, and other resources.
- True False
43. Detritus feeders and decomposers are considered predators.
- True False
44. Animal predators tend to kill the sick, weak, aged, and least fit members of a species, therefore increasing the fitness of the prey species.
- True False

45. In predator-prey relationships, the predator is seeking food for itself and its offspring, while the prey is seeking not to become food for the predator. As a result, predator and prey populations exert tremendous natural selection pressures on each other.
- True False
46. At the population level parasites are always harmful to the host species.
- True False
47. Species whose ecological niches overlap will be in competition for whatever the resource is in the overlap.
- True False
48. Hawaiian honeycreepers have evolved into species with specialized niches, which has increased the competition between these species.
- True False
49. There are always limits to population growth in nature.
- True False
50. Organisms with clumped distribution are fairly rare.
- True False
51. A population will most likely increase if it is made up mostly of individuals in the 'reproductive' or 'near reproductive' stages.
- True False
52. A population's growth rate will increase as the population reaches its carrying capacity.
- True False
53. The carrying capacity of any given area is not fixed.
- True False
54. An example of top-down population regulation in predator-prey species is predation.
- True False
55. Humans are exempt from population overshoot and dieback.
- True False

56. Large mammals, such as humans, whales, and elephants, are especially vulnerable to extinction because of their reproductive patterns.

True False

57. In communities and ecosystems the types and numbers of species change in response to changing environmental conditions.

True False

58. Scientists have changed their view about a stable type of climax community as the end product of succession and are now suggesting we can not predict the course of succession.

True False

59. Grasslands have a high resilience and therefore can quickly recover following a fire.

True False

60. Succession leads inevitably toward an ideally adapted climax plant community or ecosystem.

True False

61. Primary and secondary succession tend to increase biodiversity and the sustainability of communities and ecosystems.

True False

62. The southern sea otter has been classified as a(n) _____ species.

63. _____ is a competitive interaction between species for food and/or space.

64. _____ occurs when a member of one species feeds directly on all or part of a member of another species.

65. In _____ two species behave in ways that benefit both by providing each with needed resources.

66. The most common interaction between species is _____.

67. When two or more species compete with one another their niches are said to _____.

68. The concept that no two species can occupy the same ecological niche for an extended period of time is known as the _____.

69. When two different species interact over a long time, changes in the gene pool help both species to become more competitive or avoid competition. This is called _____.

70. Species that are bad-tasting, bad-smelling, toxic, or stinging-prey species advertise their characteristics using _____.

71. Some prey species make themselves larger, startle the predator, or mimic a predator, all of which are called _____.

72. _____ is like an arms race between interacting populations of different species.

73. Vast armies of _____ inhabit the digestive tracts of humans and help break down or digest their food.

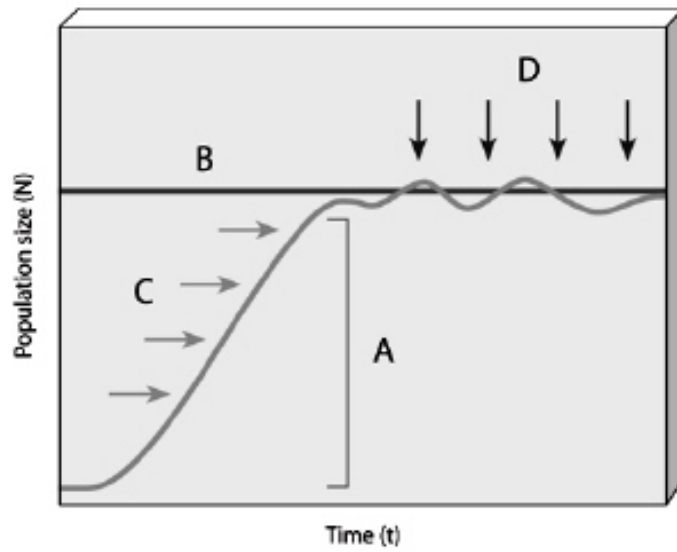
74. Five warblers in the state of Maine have evolved to share food resources and reduce food competition through _____.

75. The most common form of population dispersion found in nature is _____.

76. Individuals in populations with a high intrinsic rate of growth typically reproduce _____ and have short _____ times.

77. A population exceeding its carrying capacity suffers a(n) _____ or _____, unless the excess individuals can switch to new resources or move to a new area.
- _____
78. _____ is the combination of all factors that act to limit the growth of a population.
- _____
79. A plot of the number of individuals in a population against time yields a sigmoid or S-shaped curve, typical of _____ growth.
- _____
80. A species whose population size fluctuates slightly above and below its carrying capacity is said to have a fairly _____ population size.
- _____
81. The gradual change in species composition in a given area is called _____.
- _____
82. One of the factors determining at what rate succession occurs is _____, in which one set of species makes an area suitable for other species with different requirements.
- _____
83. _____ involves the gradual establishment of biotic communities in lifeless areas where there is no soil.
- _____
84. Systems, such as the global climate, can reach a(n) _____, where any additional stress can cause the system to change in an abrupt and usually unpredictable way that often involves collapse.
- _____

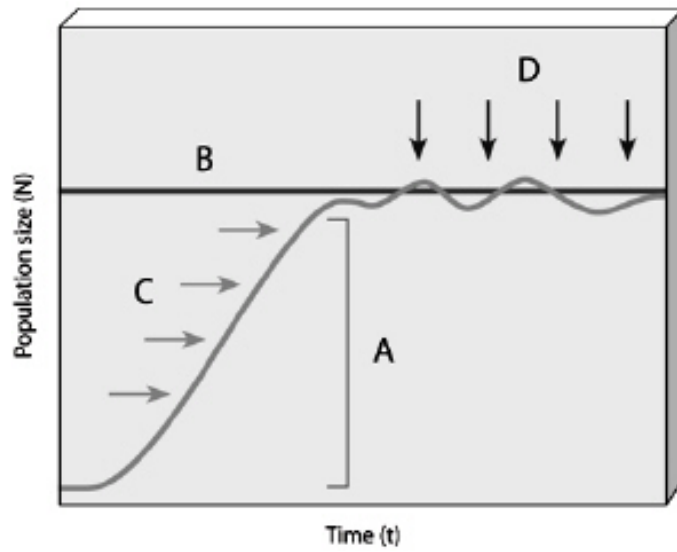
85.



Use the Figure above to answer the following question(s).

Choose the letter that represents when resources are not limiting and a population can grow at its intrinsic rate of increase.

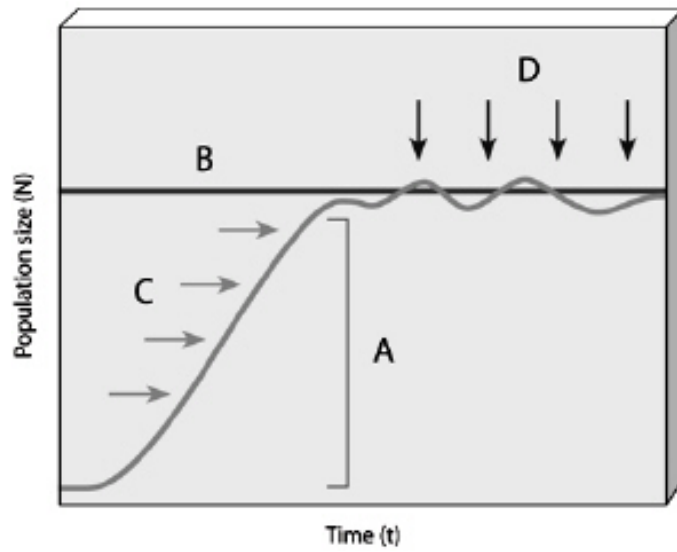
86.



Use the Figure above to answer the following question(s).

Choose the letter that represents population size when the population reaches equilibrium between resource use and population size.

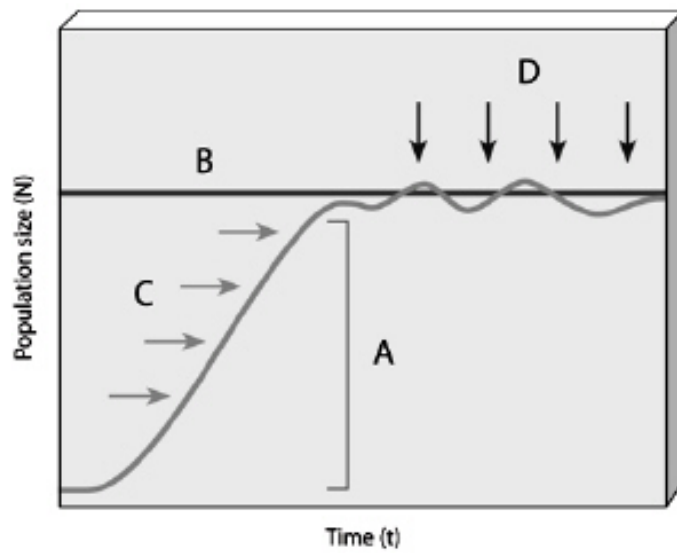
87.



Use the Figure above to answer the following question(s).

Choose the letter that represents limiting abiotic factors.

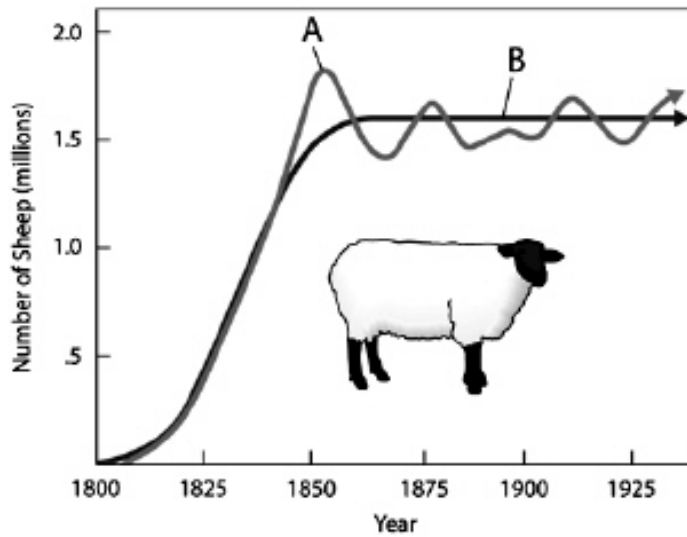
88.



Use the Figure above to answer the following question(s).

Choose the letter that represents a population's capacity for growth.

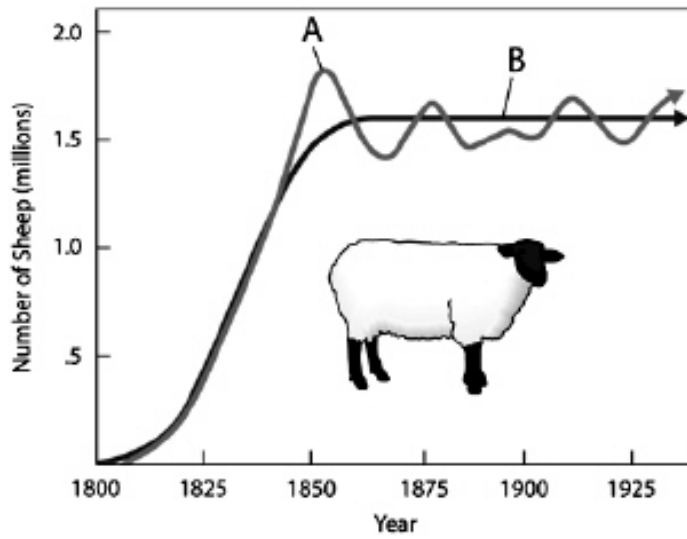
89.



Use the Figure above to answer the following question(s).

Choose the portion of the curve that results from reproductive time lag.

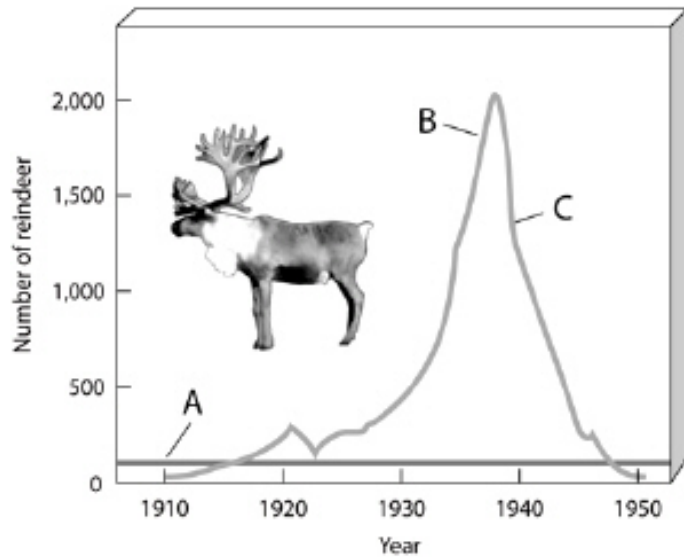
90.



Use the Figure above to answer the following question(s).

Choose the portion of the curve that results from the interaction of reproductive ability and environmental resistance.

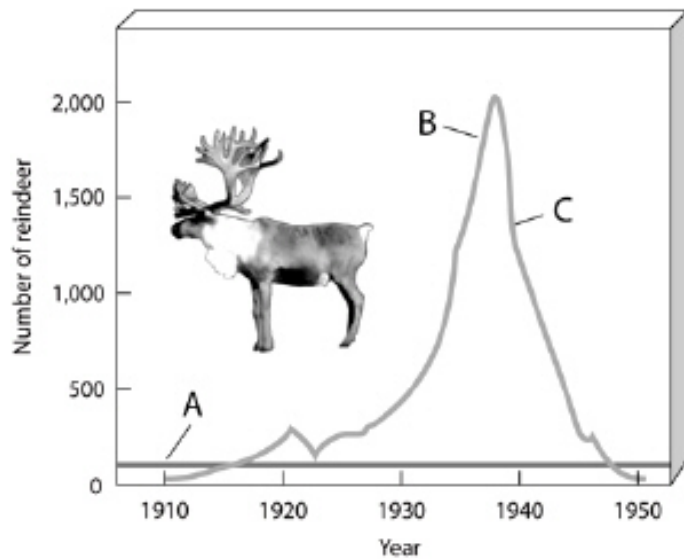
91.



Use the Figure above to answer the following question(s).

Choose the portion of the graph that can be called a dieback.

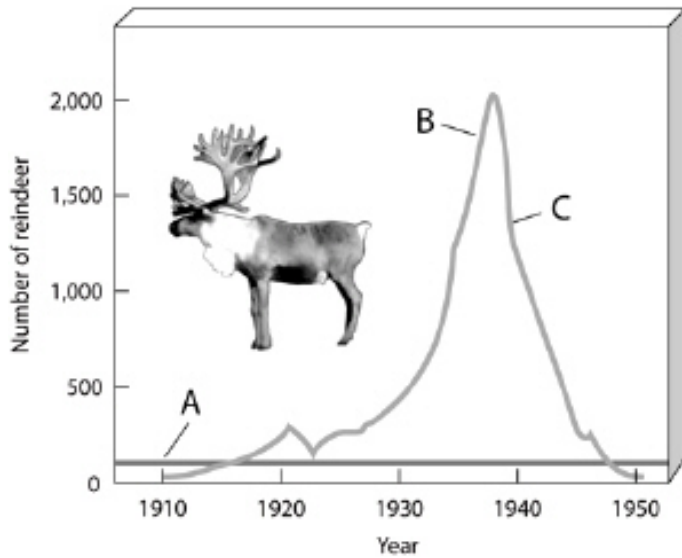
92.



Use the Figure above to answer the following question(s).

Choose the portion of the graph that represents the number of reindeer that can be sustained indefinitely in a given area.

93.



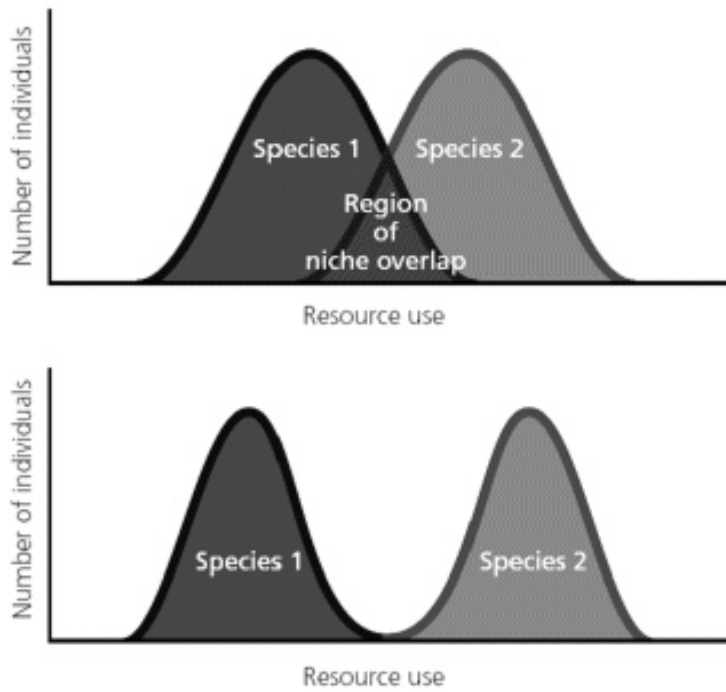
Use the Figure above to answer the following question(s).

Choose the portion of the graph that represents the number of reindeer that exceeded the capacity of their environment.

94. The author relates that some people think humans can keep expanding our environmental footprint indefinitely because of technology. Others think that we will, sooner or later, reach natural limits to our expansion. What do you think?

95. Considering the different types of interactions mentioned at the beginning of the chapter, what kind of relationship do you think we have with most of the natural world?
96. Using a small rodent, such as a field mouse, and a predator, such as a snake, explain how coevolution works.
97. Explain coevolution using the interaction between the malaria parasite and humans.

98.



Observe the Figure above. Notice that in the upper graph the two species overlap. That region of niche overlap places the species in competition for the shared resource. Explain why this is not useful and how the niches of the two species have come to be separated as shown in the lower graph.

99. At the present time the global human population approaches 7 billion persons. If we exceed the carrying capacity of the earth, the human population may suffer a substantial collapse. Given the following formula for population change:

$$\text{Population change} = (\text{births} + \text{immigration}) - (\text{deaths} + \text{immigration})$$

What will be required of humans in order to stabilize or reduce our population?

100. Basic to the theory of evolution are the concepts of environmental resistance and biotic potential. Explain how these concepts are central to natural selection.

CHAPTER 5--BIODIVERSITY, SPECIES INTERACTIONS, AND POPULATION CONTROL **Key**

1. B
2. B
3. A
4. C
5. E
6. A
7. C
8. C
9. E
10. D
11. A
12. D
13. B
14. D
15. C
16. D
17. C
18. B
19. E
20. B
21. C
22. C
23. D
24. D
25. E
26. D
27. A
28. C
29. E

- 30. D
- 31. B
- 32. E
- 33. B
- 34. A
- 35. E
- 36. E
- 37. B
- 38. D
- 39. D
- 40. TRUE
- 41. FALSE
- 42. TRUE
- 43. FALSE
- 44. TRUE
- 45. TRUE
- 46. FALSE
- 47. TRUE
- 48. FALSE
- 49. TRUE
- 50. FALSE
- 51. TRUE
- 52. FALSE
- 53. TRUE
- 54. TRUE
- 55. FALSE
- 56. TRUE
- 57. TRUE
- 58. TRUE
- 59. TRUE
- 60. FALSE
- 61. TRUE
- 62. keystone
- 63. Interspecific competition

64. Predation
65. mutualism
66. competition
67. overlap
68. competitive exclusion principle
69. coevolution
70. warning coloration
71. behavioral strategies
72. Coevolution
73. bacteria
74. resource partitioning
75. clumped
76. early in life; generation
77. dieback; crash *or* crash; dieback
78. Environmental resistance
79. logistic
80. stable
81. ecological succession
82. facilitation
83. Primary succession
84. tipping point
85. A
86. B
87. D
88. C
89. A
90. B
91. C
92. B
93. B
94. Answers will vary.
95. Answers will vary.
96. (page 109) The rodent responds to the environmental pressure applied by the snake through changes in behavior, anatomy, or physiology to reduce the predation. The snake, facing reducing predatory success, changes in response to the rodent. The rodent again responds to the specifics of the environmental pressure. This step by step changing is coevolution.

97. (page 109) The malaria parasite seeks to avoid being swept into the spleen of the human where it would be destroyed. It does so by sticking the infected cell to the wall of a blood vessel using a sticky protein. A human's immune system identifies the protein and sends antibodies to attack the protein. The malaria parasite produces additional sticky proteins and switches to one that is not identified by the immune system.

98. Niche overlap places the two species in competition for the limited resource. Competition requires the expenditure of energy and reduces the energy available for other necessities. Over time, natural selection will choose those members of the species who have to expend less of their energy in competition. Eventually the two niches will overlap less.

99. (page 109) Any population, including the human population, increases or decreases according to the formula: $\text{Population change} = (\text{births} + \text{immigration}) - (\text{deaths} + \text{emigration})$. Speaking on a global scale, there is no place for us to come from (immigration) or go to (emigration). That means population change is limited to births minus deaths. To put it in the crudest of terms, we must either reduce the number of births or increase the number of deaths in order to stabilize or reduce our population. If we choose not to undertake that change, nature will do so as we exceed our carrying capacity.

100. Natural selection is based on differential reproduction and variation. As environmental pressures (resistance) increase they push against the ability of the species to reproduce (biotic potential). Those members of the species that are best able to withstand the environmental pressures will most likely be able to reproduce at a higher level.