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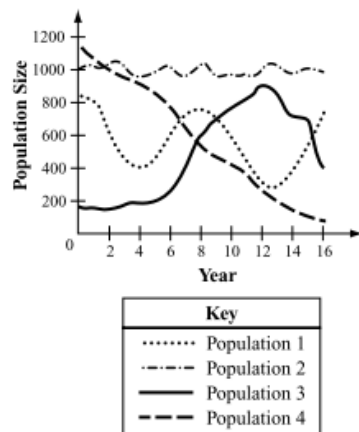
Population Size MCAS Questions

1. There is a limit to how large any given population can grow. Which of the following statements **best** explains why a population must eventually stop growing?
 - A. A low female-to-male ratio develops in the population as it grows.
 - B. Old individuals outnumber juveniles in the population as it grows.
 - C. The resources available are fully used by the population as it grows.
 - D. Natural selection changes the gene pool of the population as it grows.
2. An animal population decreases from 800 individuals to 600 individuals. Which of the following could explain this change in population size?
 - A. The population size of the animal's predator increased.
 - B. The emigration rate of the animals from the population decreased.
 - C. The number of breeding pairs in the animal's population increased.
 - D. The number of species competing with the animal for food decreased.
3. Wolves were reintroduced into Yellowstone National Park in 1995. Wolves hunt elk, but the elk population in the park has declined more than it was expected to decline from direct predation by wolves. Other than direct predation, which of the following factors **most likely** contributed to the decline in the elk population?
 - A. decreased birth rate in elk
 - B. decreased emigration of elk
 - C. decreased parasite load in elk
 - D. decreased competition between elk
4. In a population of rodents, birth rate plus immigration rate is greater than death rate plus emigration rate. Which of the following occurs under these conditions?
 - A. The size of the population always increases.
 - B. The size of the population always decreases.
 - C. The size of the population never changes.
 - D. The size of the population never reaches its carrying capacity.
5. The number of monarch butterflies counted in one location in the western United States dropped from 354,300 to 50,853 over a 10-year period. Which of the following statements **best** explains the drop in the number of monarch butterflies counted?
 - A. The death rate was greater than the birth rate.
 - B. The emigration rate was greater than the death rate.
 - C. The birth rate was greater than the immigration rate.
 - D. The immigration rate was greater than the emigration rate.

6. Sea otters are small marine mammals that prey on fish, clams, crabs, and sea urchins. Sea otters' natural predators include bears, sharks, and killer whales, but humans have also threatened sea otter populations. Hunting of sea otters for their fur severely reduced sea otter populations in the 18th and 19th centuries.

After laws and programs were put into place to protect sea otters, their populations started increasing. Some sea otter populations in Alaska are now decreasing again. Which of the following is the **most likely** cause of these decreases?

- A. greater numbers of killer whales
 - B. larger populations of sea urchins
 - C. less competition from other marine mammals
 - D. limited immigration of sea otters from California
7. Which of the following **most likely** results in a decrease in a blackbird population?
- A. birth
 - B. emigration
 - C. immigration
 - D. mutualism
8. The graph below shows changes in the sizes of four animal populations over a 16-year period.



In which population was birthrate most likely greater than death rate from year 8 to year 12?

- A. population 1
- B. population 2
- C. population 3
- D. population 4

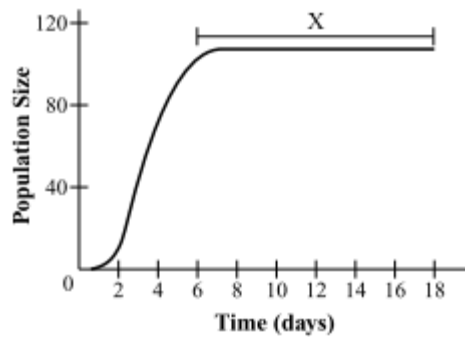
9. Which of the following is an example of emigration?
- A. A small number of hummingbirds leave an island.
 - B. A large number of hummingbirds die in a hurricane.
 - C. A species of hummingbird lays its eggs in the summer months.
 - D. A species of hummingbird adapts to its environment over time.
10. The willow flycatcher is a bird species with a summer range throughout much of the United States. Which of the following would directly decrease the size of a willow flycatcher population in a given year?
- A. the disappearance of a species that preys on willow flycatchers
 - B. the arrival of migrating willow flycatchers from populations in other areas
 - C. the emigration of male willow flycatchers that did not secure territories
 - D. the hatching of a larger percentage of eggs in the willow flycatcher population
11. Spruce budworms are a type of moth. For every 100 budworm eggs, only about 1% reach adulthood. The table below shows the average number of budworms that survive and the main cause of death at each life cycle stage prior to the adult stage.

Stage in Life Cycle	Average Number Alive at Start of Stage	Main Cause of Death during Stage
egg	100	parasite
early larva	85	dispersal to unsuitable habitat
late larva	17	parasite, disease
pupa	2	parasite
adult	1	

Based on the data in the table, which of the following changes would **most** improve the percentage of budworms surviving to adulthood?

- A. a thinner cocoon wall in the pupal stage
- B. a slower rate of development in the late larval stage
- C. a decrease in exposure to disease in the pupal stage
- D. an increase in resistance to parasites during the egg stage

12. The graph below shows population growth for paramecia kept under laboratory conditions for 18 days.



Which of the following statements explains what is happening in the region of the curve labeled “X”?

- A. The population’s birthrate is zero.
- B. The paramecia are in water that is too warm.
- C. The paramecia have used up their food supply.
- D. The population’s birthrate equals the death rate.

13. The size of a bird population increased by two percent in one year. Which of the following could have contributed to the population increase?

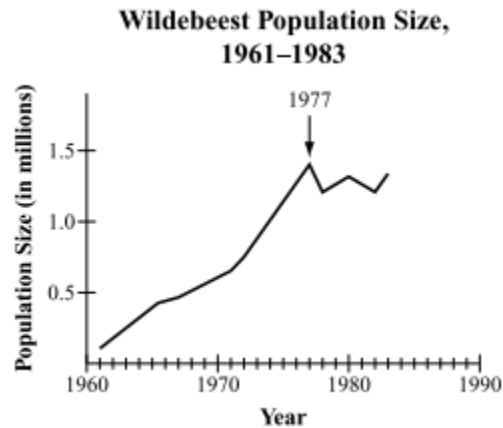
- A. a decrease in the death rate of baby birds
- B. an increase in the number of the birds’ predators
- C. an increase in the average number of parasites per bird
- D. a decrease in the immigration of birds of the same species

14. On remote islands, immigration and emigration usually do not have a large effect on population sizes. A bird population on a remote island remains at a relatively constant size year after year.

Which of the following **most likely** describes the birthrate and the death rate for this population?

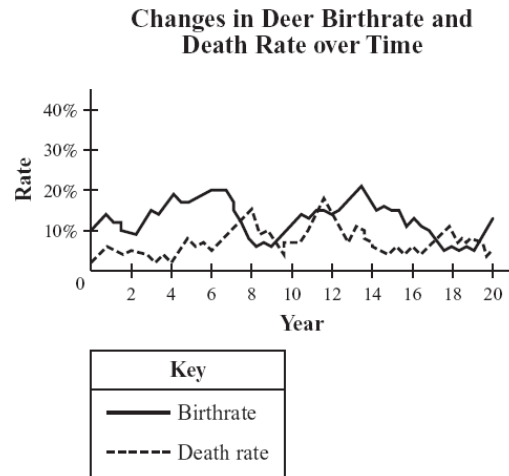
- A. Birthrate and death rate are both zero.
- B. Birthrate and death rate are close to equal.
- C. Birthrate is significantly less than death rate.
- D. Birthrate is significantly greater than death rate.

15. Cattle-like animals called wildebeests live in Africa. The wildebeest population decreased for many years because of a fatal virus. The virus was eliminated in the 1960s by vaccinating the wildebeests against the virus. The graph below shows changes in the size of the wildebeest population from 1961 to 1983.



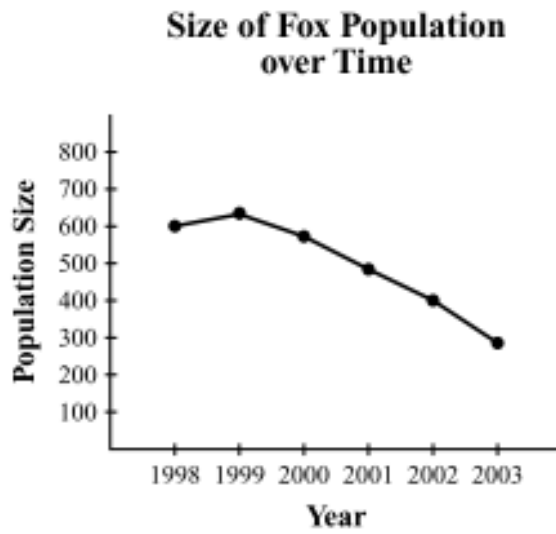
- a. Describe the effect of the vaccinations on the death rate in the wildebeest population.
- b. Explain the change in the size of the population from 1961 to 1977 in terms of birth rate and death rate. Assume immigration and emigration rates were equal during this time.
- c. Based on the graph, describe what happened to the wildebeest population size from 1977 to 1983 **and** explain why this pattern most likely occurred.

16. The graph below shows changes in the birthrate and death rate for a large population of deer over a 20-year study period.



- d. Describe and explain **two** factors that can affect the birthrate in the deer population.
- e. Describe and explain **two** factors that can affect the death rate in the deer population.
- f. Identify **one** time period on the graph during which the deer population was increasing. Explain your answer.

1. The graph below shows the changes in the size of a fox population over time.



- a. Identify **three** different factors that could have caused the overall decrease in the fox population.

- b. Explain, in detail, how **each** factor you identified in part (a) would have caused the decrease.