

CHAPTER 19—POPULATIONS

MULTIPLE CHOICE

1. Because individuals in a population usually tend to produce more than one offspring,
 - a. populations tend to increase in size.
 - b. populations remain stable in size.
 - c. individuals tend to die quickly.
 - d. the number of individuals declines rapidly.

ANS: A DIF: 1 OBJ: 19-1.1

2. Which of the following does *not* represent a population?
 - a. all the robins in Austin, Texas
 - b. all the grass frogs in the pond of Central Park in New York City
 - c. all the birds in Chicago, Illinois
 - d. all the elk in Yosemite National Park

ANS: C DIF: 1 OBJ: 19-1.1

3. Demographic studies of populations must take into consideration
 - a. population size.
 - b. population density.
 - c. population dispersion.
 - d. All of the above

ANS: D DIF: 1 OBJ: 19-1.1

4. Regarding population dispersion patterns, which of the following is an *improper* pairing?
 - a. random—not evenly spaced
 - b. uniform—evenly spaced
 - c. clumped—clustered in space
 - d. random—clustered in space

ANS: D DIF: 1 OBJ: 19-1.2

5. Trees growing along the banks of a river but not growing in the surrounding area would best be described as a ____ dispersion of the trees.
 - a. clumped
 - b. uniform
 - c. random
 - d. mixture of clumped, uniform, and random

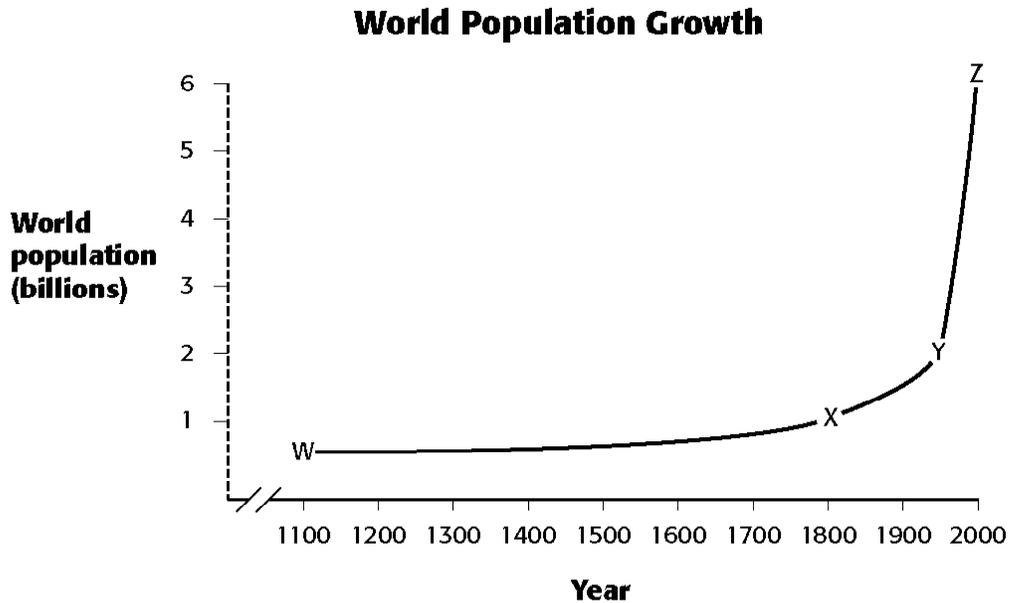
ANS: A DIF: 2 OBJ: 19-1.2

6. If a population is composed of equal numbers of people of pre-reproductive, reproductive, and post-reproductive age, what will most likely happen to the size of the population?
 - a. It will grow steadily.
 - b. It will experience no growth for a time and then increase rapidly.
 - c. It will decrease steadily.
 - d. It will experience no growth for a time and then decrease rapidly.

ANS: A DIF: 2 OBJ: 19-1.3

7. A population of organisms grows
- with no natural restrictions except the availability of food.
 - when the birth rate exceeds the death rate.
 - only in the absence of predators or natural diseases.
 - All of the above

ANS: B DIF: 1 OBJ: 19-1.3



8. Refer to the illustration above. Which time period shows the highest rate of growth of the population?
- period W–X
 - period W–Y
 - period X–Y
 - period Y–Z

ANS: D DIF: 2 OBJ: 19-2.2

9. Refer to the illustration above. Which of the following contributed to the change in world population during the 1900s that is shown in the graph?
- better sanitation
 - improved health care
 - agricultural improvements
 - All of the above

ANS: D DIF: 2 OBJ: 19-3.1

10. Refer to the illustration above. Which point on the graph indicates the approximate world population in the year 1950?
- W
 - X
 - Y
 - Z

ANS: C DIF: 2 OBJ: 19-3.2

11. Refer to the illustration above. The American Revolution began in 1776. According to the graph, what was the approximate world population at that time?
- 500 thousand
 - 1 million
 - 1 billion
 - 2 billion

ANS: C DIF: 2 OBJ: 19-3.2

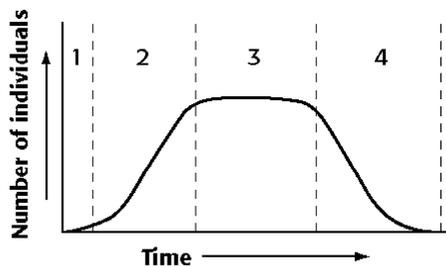
12. exponential model : how all populations can potentially grow without limits ::
- population model : how organisms live in an area
 - logistic model : how populations grow when carrying capacity is limited
 - demographic model : how people move into and out of countries throughout history
 - growth rate model : how populations grow when immigration is limited

ANS: B DIF: 2 OBJ: 19-2.2

13. Birth and death rates are ____ on an exponential growth curve, whereas they are ____ on a logistic growth curve.
- variable; constant
 - high; low
 - steady; changing
 - unrestricted; restricted

ANS: C DIF: 2 OBJ: 19-2.2

Population Growth Over Time



14. Refer to the illustration above. During which time period are the birth rate and death rate equal?
- period 1
 - period 2
 - period 3
 - period 4

ANS: C DIF: 2 OBJ: 19-2.1

15. Refer to the illustration above. The rate of growth of a population is represented by r . During which time period does $r = 0$?
- period 1
 - period 2
 - period 3
 - period 4

ANS: C DIF: 2 OBJ: 19-2.1

16. Refer to the illustration above. The time period during which r would have a negative value is
- period 1
 - period 2
 - period 3
 - period 4

ANS: D DIF: 2 OBJ: 19-2.1

17. As a population reaches its carrying capacity, there may be an increase in competition for
- a. food.
 - b. shelter.
 - c. mates.
 - d. All of the above

ANS: D DIF: 1 OBJ: 19-2.3

18. Which of the following is a density-independent regulatory factor?
- a. food
 - b. water
 - c. severe weather
 - d. number of nesting sites

ANS: C DIF: 1 OBJ: 19-2.3

19. All of the following are problems arising from inbreeding *except*
- a. reduction of a population's genetic diversity.
 - b. increased genetic diversity within a population.
 - c. increased chance of homozygous recessive alleles for disease occurring.
 - d. reduction of a population's ability to adapt to environmental changes.

ANS: B DIF: 1 OBJ: 19-2.4

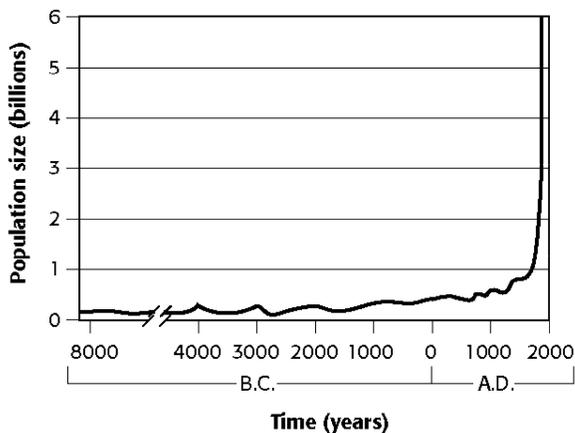
20. Which population might be least likely to be devastated by a new disease outbreak?
- a. a small population made up of the offspring of healthy, related parents
 - b. a large, genetically diverse population
 - c. a small, genetically uniform population
 - d. a large, genetically uniform population

ANS: B DIF: 1 OBJ: 19-2.4

21. The agricultural revolution enabled Earth's human population to increase dramatically because it
- a. allowed people to live in one place instead of moving from place to place in search of food.
 - b. stabilized and increased available food supplies.
 - c. resulted in people having more free time.
 - d. provided plenty of work for most of Earth's population.

ANS: B DIF: 2 OBJ: 19-3.1

Human Population Growth



22. Refer to the illustration above. According to the graph, the human population
- began to increase at an accelerated pace starting about 1650.
 - doubled in size from 2000 BCE to 1000 BCE.
 - reached 1 billion in 1492.
 - will stop growing in the year 2000.

ANS: A DIF: 2 OBJ: 19-3.2

23. Refer to the illustration above. According to the graph,
- there were no humans on Earth around 4000 BCE.
 - the human population has never decreased in size.
 - increase in the food supply was responsible for the increase in the population.
 - the human population has risen dramatically in recent years.

ANS: D DIF: 2 OBJ: 19-3.2

24. Human population growth is currently most rapid in
- | | |
|------------------------------|--------------------------|
| a. European countries. | c. developed countries. |
| b. North American countries. | d. developing countries. |

ANS: D DIF: 1 OBJ: 19-3.3

COMPLETION

1. Population density refers to how many _____ are present in a particular location.

ANS:
 individual members of a species
 individuals of a species
 individuals

DIF: 1 OBJ: 19-1.1

2. The way that members of a population are arranged in a given area is called the _____ of the population.

ANS: dispersion

DIF: 1 OBJ: 19-1.1

3. A population of organisms will grow when its _____ exceeds its death rate.

ANS: birth rate

DIF: 1 OBJ: 19-1.3

4. A _____ is the average mortality rate of individuals of a species, over a typical lifetime, modeled as a curve on a graph.

ANS: survivorship curve

DIF: 1 OBJ: 19-1.4

5. _____ is the study and measurement of the factors that determine how populations grow.

ANS: Demography

DIF: 2 OBJ: 19-2.1

6. _____ is defined as the amount by which a population's size changes in a given amount of time.

ANS: Growth rate

DIF: 1 OBJ: 19-2.1

7. The population size that can be sustained by an environment is called the _____ of the environment.

ANS: carrying capacity

DIF: 1 OBJ: 19-2.2

8. The main reason Earth's human population has increased over the past 350 years is because of a decrease in the _____ rate.

ANS: death

DIF: 1 OBJ: 19-3.2

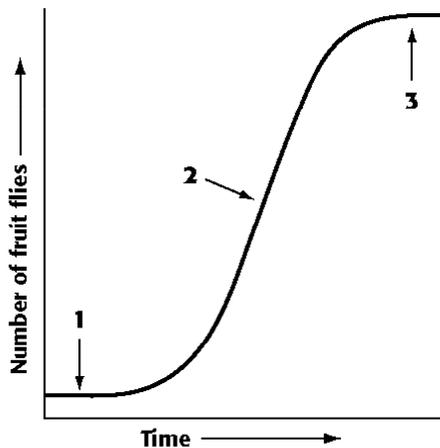
9. The _____ countries are currently experiencing the greatest increase in population growth.

ANS: developing

DIF: 1 OBJ: 19-3.3

PROBLEM

1.



Refer to the illustration above. The graph depicts the growth of a population of fruit flies in an enclosed area over time. Write your answers to the following in the spaces below.

- Why does the population stop increasing after it reaches the point on the curve labeled “3”?
- If a density-dependent limiting factor is present, does it have a greater impact on the population at point 1, point 2, or point 3 on the curve? Why?
- Name one density-independent limiting factor that could affect this population of fruit flies. Would you expect this limiting factor to have a greater impact on the population at any particular point on the curve, and if so, which one?

ANS:

- The population stops increasing because it has reached the carrying capacity of the ecosystem in which it lives. The ecosystem cannot support any more flies than this number.
- It has the greatest impact on the population at point 3. This is because population density is greatest at point 3. Density-dependent limiting factors impact populations more as populations increase in density.
- Suitable answers include a number of abiotic factors. The most obvious answer and the most commonly important abiotic factor is a temperature extreme (e.g., freezing). Other abiotic limiting factors include floods, hurricanes, fires, and volcanic eruptions. Such limiting factors would not be expected to have a greater impact on the population at any particular population size.

DIF: 3 OBJ: 19-2.3

ESSAY

1. Give an example of an organism with a Type III survivorship curve, and explain the advantage a high reproductive rate might give an organism with this type of survivorship curve. Write your answer in the space below.

ANS:

Organisms with a Type III survivorship curve, such as salmon, insects, or frogs, produce many young at once. A large number of these individuals die while young. A high reproductive rate offsets this enormous early mortality.

DIF: 2

OBJ: 19-1.4

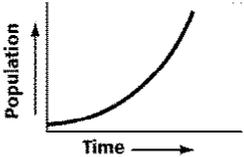
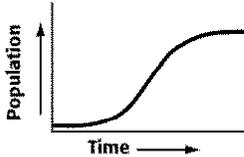
2. Contrast exponential population growth with logistic population growth by completing the chart below.

| Criteria | Exponential Population Growth | Logistic Population Growth |
|-----------------------|-------------------------------|----------------------------|
| Graph of growth rate | | |
| Assumptions | | |
| Birth and death rates | | |

ANS:

| Criteria | Exponential Population Growth | Logistic Population Growth |
|-----------------------|-------------------------------|----------------------------|
| Graph of growth rate | | |
| Assumptions | | |
| Birth and death rates | | |

ANS:

| Criteria | Exponential Population Growth | Logistic Population Growth |
|-----------------------|---|--|
| Graph of growth rate |  |  |
| Assumptions | Unlimited resources | Resources limit population growth; stabilizes at the carrying capacity |
| Birth and death rates | Constant--rates do not change | Vary with population size |

DIF: 2

OBJ: 19-2.2