

## Chapter 3: Human Populations

### Multiple Choice Questions

1. Which of the following statements about population ecology is true?

- a) Population ecology focuses on individuals and their interactions, but not the abiotic environment.
- b) Population ecology attempts to explain how and why the number of individuals changes over time.
- c) Population ecology is not important to scientists in applied disciplines, such as wildlife management.
- d) Population ecology deals with organisms in nature, but cannot be applied to the study of human populations.

Ans: b

Section Ref: Population Ecology

2. How many people live in China today?

- a) 1.3 million
- b) 13 million
- c) 130 million
- d) 1.3 billion

Ans: d

Section Ref: Chapter Opener

3. What do population ecologists study?

- a) how animal communities form and interact
- b) how groups of animals of the same species respond to its environment
- c) the impact of humans on organisms and the environment
- d) how ecosystems fit into the landscape

Ans: b

Section Ref: Population Ecology

4. What term or phrase do population ecologists use to describe the maximum number of individuals of a given species that a particular environment can support for an indefinite period, assuming there are no changes in the environment?

- a) environmental resistance
- b) intrinsic rate of increase
- c) carrying capacity

d) sustainability

Ans: c

Section Ref: Environmental Resistance and Carrying Capacity

5. What term best describes the movement of individuals out of a population?

- a) natural increase
- b) emigration
- c) immigration
- d) zero population growth

Ans: b

Section Ref: How Do Populations Change in Size?

6. What does the growth rate depend upon?

- a) birthrate
- b) death rate
- c) dispersal
- d) all of these

Ans: d

Section Ref: How Do Populations Change in Size?

7. In order for the growth rate to remain constant what must happen to the birth rate?

- a) it must equal zero
- b) it must decline
- c) it needs to be less than emigration
- d) it must equal the death rate

Ans: d

Section Ref:

8. Which of the following organisms would be predicted to have the *lowest* biotic potential?

- a) bacteria
- b) humans
- c) cockroaches
- d) whales

Ans: d

Section Ref: Maximum Population Growth

9. What can you conclude about the bacteria population shown in the graph?

<b>Time (hours)</b>	<b>Number of bacteria</b>
0	1
1	4
2	16
3	64
4	256
5	1024
6	4096
7	16,384
8	65,536
9	262,144
10	1,048,576

- a) carrying capacity has been reached
- b) the population is growing at its biotic potential
- c) the population is growing linearly
- d) reproductive rate exceeds the ability of the environment to sustain it

Ans: b

Section Ref: Maximum Population Growth

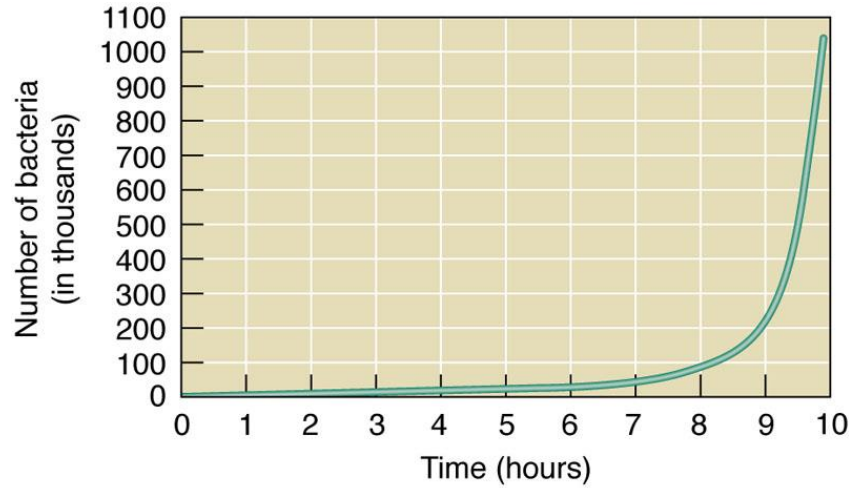
10. What term is used to describe life history factors that limit population growth?

- a) biotic potential
- b) environmental resistance
- c) natural increase
- d) demographics

Ans: b

Section Ref: Environmental Resistance and Carrying Capacity

11. What type of growth is shown in the figure?

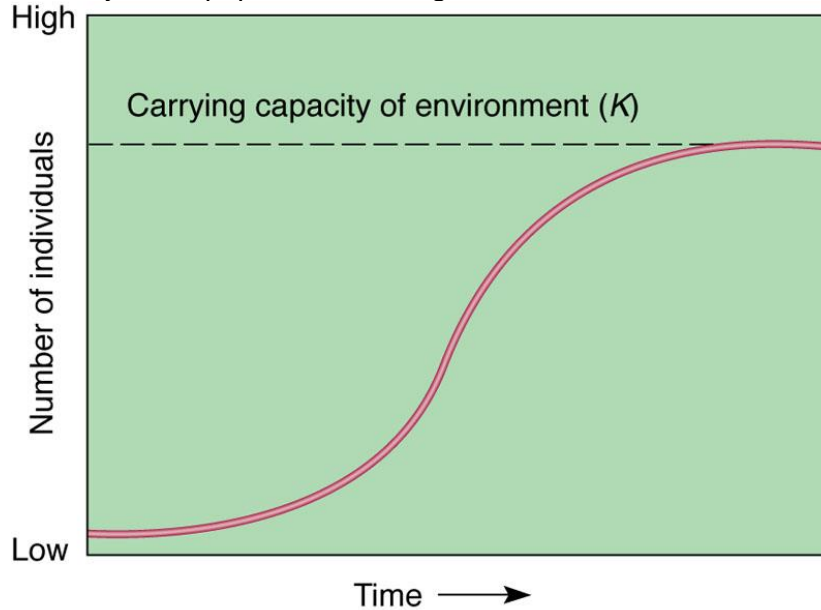


- a) geometric
- b) exponential
- c) arithmetic
- d) logarithmic

Ans: b

Section Ref: Maximum Population Growth

12. Why is the population leveling off?



- a) Paramecium are dispersing to other habitats.
- b) Environmental resistance is declining.
- c) The population is approaching carrying capacity.
- d) The population has reached its biotic potential.

Ans: c

Section Ref: Environmental Resistance and Carrying Capacity

13. What caused the population of reindeer on one of the Pribilof Islands off the coast of Alaska to crash?

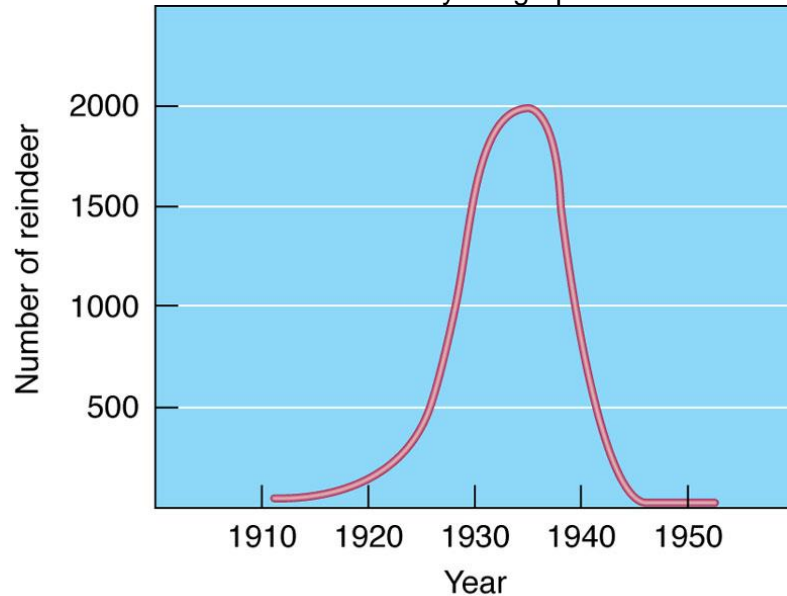


- a) overgrazing
- b) disease
- c) predation by wolves
- d) hunting

Ans: a

Section Ref: Environmental Resistance and Carrying Capacity

14. What condition is illustrated by the graph below?



- a) Carrying capacity has been reached.

- b) Environmental resistance caused the population to decline.
- c) Population approached its biotic potential.
- d) population crash

Ans: d

Section Ref: Environmental Resistance and Carrying Capacity

15. Which scientist first sounded the alarm about the growth of the human population and the ability of the earth to handle a large population of humans?

- a) Charles Darwin
- b) Paul Ehrlich
- c) Thomas Malthus
- d) James Lovelock

Ans: c

Section Ref: Human Population Patterns and Demographics

16. What was the human population in 2007?

- a) 3.6 billion
- b) 4.2 billion
- c) 5.8 billion
- d) 6.7 billion

Ans: d

Section Ref: Human Population Patterns and Demographics

17. What is the cause of the recent increase in world human population growth?

- a) lower birth rate.
- b) higher fecundity rate.
- c) lower death rate.
- d) decrease in immigration.

Ans: b

Section Ref: Human Population Patterns and Demographics

18. Based on United Nations high estimate how large is the population expected to be in 2050?

- a) 6.7 billion
- b) 8.1 billion
- c) 7.7 billion
- d) 10.6 billion

Ans: d

Section Ref: Projecting Future Population Numbers

19. What is the current world human population growth rate?

- a) 0
- b) 0.6
- c) 1.2
- d) 2.6

Ans: c

Section Ref: Projecting Future Population Numbers

20. Based on current technology, what is the best estimate of the maximum population that the earth can support?

- a) 6.5 million
- b) 7.7 million
- c) 10 million
- d) 15 million

Ans: b

Section Ref: Projecting Future Population Numbers

21. Which of the following may occur if the human population exceeds the earth's carrying capacity?

- a) widespread environmental deterioration
- b) massive waves of human suffering and death
- c) threats to the long-term survival of the human species
- d) all of the above are possible

Ans: d

Section Ref: Projecting Future Population Numbers

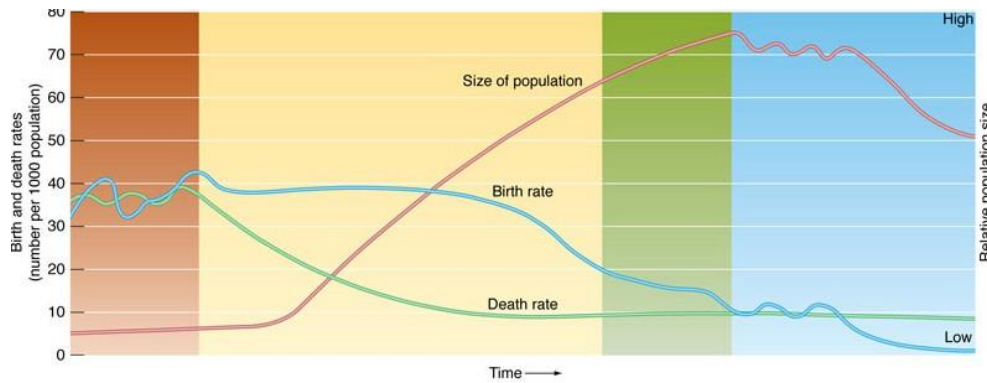
22. What do demographers study?

- a) the earth's carrying capacity
- b) population changes and characteristics
- c) energy resources
- d) food production

Ans: b

Section Ref: Demographics of Countries

23. Why does the death rate usually decline quickly during a demographic transition?



- a) improved health care and modern medicines
- b) increased education of women
- c) increased contraceptive use
- d) increased economic productivity

Ans: a

Section Ref: Demographic Transition

24. What happens during the pre-industrial stage (1) of the demographic transition?

- a) birth and death rates are high
- b) low death rate
- c) only very light industrialization
- d) low birth rate

Ans: a

Section Ref: Demographic Transition

25. What happens during the post-industrial stage (4) of the demographic transition?

- a) modest population growth
- b) high death rate
- c) greater affluence and higher levels of education
- d) high birth rate

Ans: c

Section Ref: Demographic Transition

26. What is life expectancy?

- a) maximum age that an individual of a given species could reach
- b) number of individuals in a population that survive in a given year
- c) number of years an individual of a certain age will probably live
- d) probability that an individual will survive infancy

Ans: c

Section Ref: Demographics of Countries



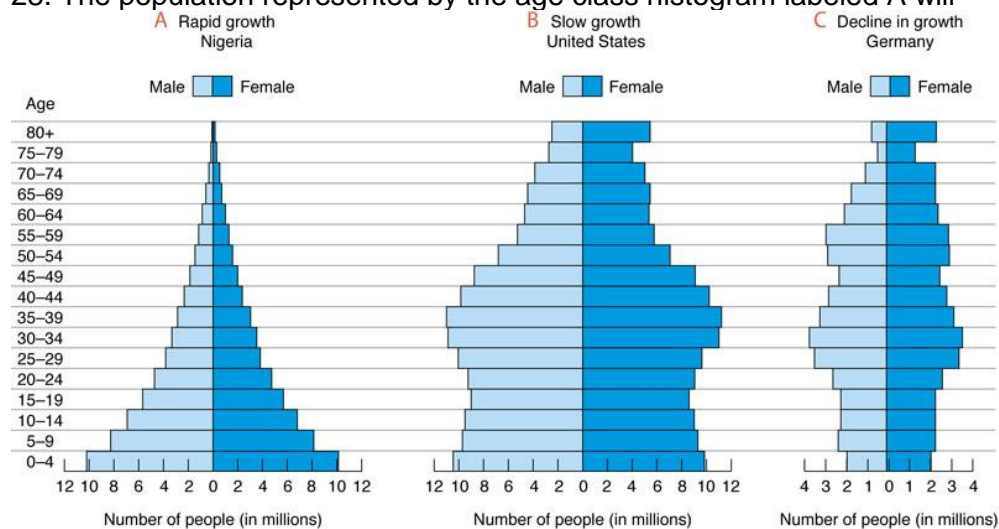
27. What does an age structure diagram shaped like a pyramid indicate?

- a) a decreasing population growth rate
- b) an increasing population growth rate
- c) a steady rate of population growth
- d) a population crash

Ans: b

Section Ref: Age Structure of Countries

28. The population represented by the age class histogram labeled A will

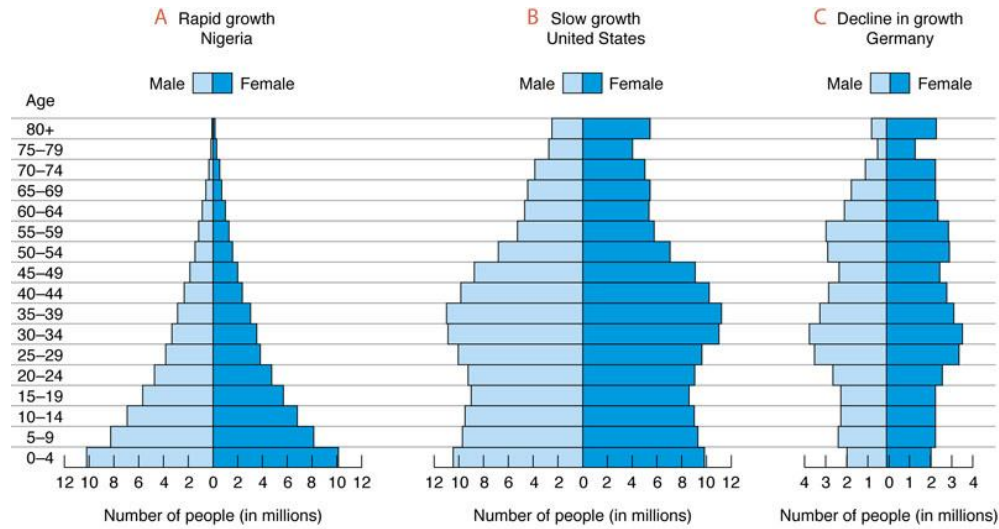


- a) not grow much in the coming years.
- b) soon begin to decline.
- c) grow substantially in the future.
- d) grow slowly in the future.

Ans: c

Section Ref: Age Structure of Countries

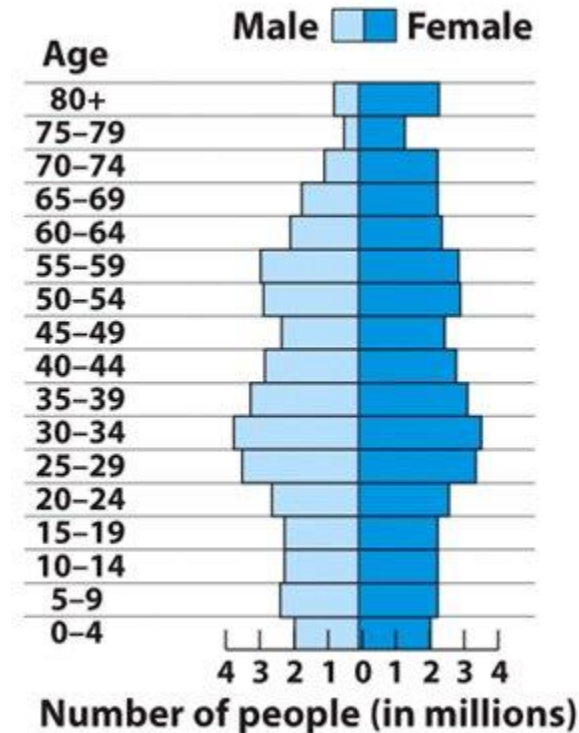
29. What is likely to happen to the population represented by the age class histogram labeled C?



- a) it should remain stable in the coming years.
- b) it will begin to decline soon.
- c) it should grow substantially in the future.
- d) it will grow slowly in the future.

Ans: b  
 Section Ref: Age Structure of Countries

30. What conclusions can be drawn about the population shown in the population below?



- a) elderly people are dying more quickly than in the past
- b) fertility rates are high

- c) population is declining
- d) the population is stable

Ans: d

Section Ref: Age Structure of Countries

31. China has greatly reduced their fertility rates. What method did they use?

- a) increased economic development
- b) increased educational opportunities for women
- c) strictly enforced increased marriage age
- d) strictly enforced limits on number of infants born

Ans: d

Section Ref: Age Structure of Countries

32. The total fertility rate is the number of children born

- a) to the average woman per year.
- b) to the average woman during her lifetime.
- c) in the world during a single year.
- d) in a population during a single year.

Ans: b

Section ref: Demographics of Countries

33 What is the replacement-level fertility rate in humans?

- a) 1.7
- b) 2.1
- c) 2.7
- d) 3.0

Ans: b

Section Ref: Demographics of Countries

34. What are the 3 most populous countries?

- a) China, India, Russia
- b) China, India, United States
- c) China, Bangladesh, India
- d) Pakistan, Indonesia, Japan

Ans: b

Section Ref: Critical and Creative Thinking Questions

35. The natural birth rate in Canada is declining yet the population continues to grow. What makes that possible?

- a) immigration
- b) increasing numbers of seniors in the population
- c) continued expansion of the baby boom bulge
- d) the development of improved population enumeration techniques

Ans: a

Section Ref: Population Dynamics in Canada

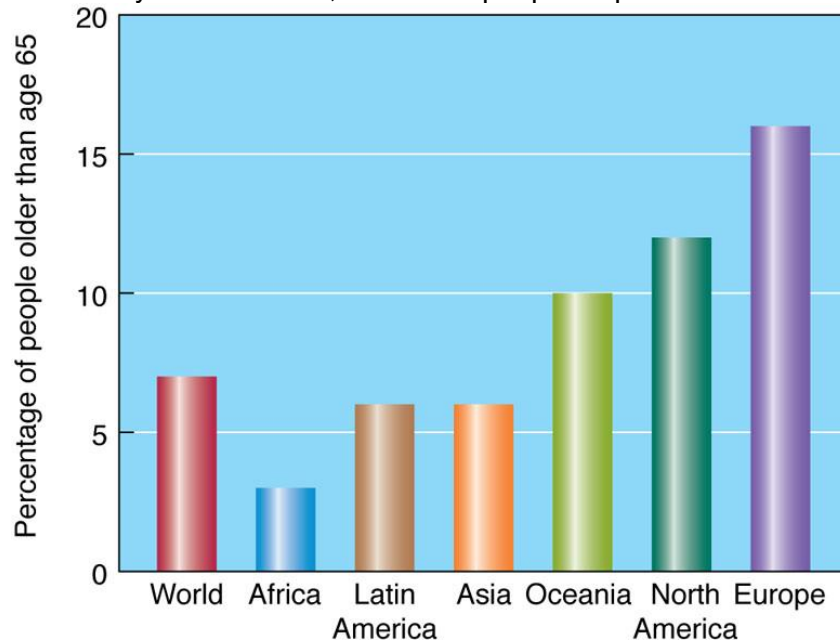
36. What proportion of Canada's population consisted of seniors in 2006?

- a) 5.1 percent
- b) 7.2 percent
- c) 12.5 percent
- d) 13.2 percent

Ans: d

Section Ref: Population Dynamics in Canada

37. Which of the continents shown is likely to have a higher percentage of people who are chronically ill or disabled, and these people require more health care and other social services?



- a) Africa
- b) Asia
- c) Europe
- d) North America

Ans: c

Section Ref: Age Structure of Countries

38. Improving economy in a country is generally correlated with which of the following?

- a) increased birth rate and increased population growth rate
- b) increased death rate and decreased population growth rate
- c) decreased birth rate and decreased population growth rate
- d) decreased death rate and increased population growth rate

Ans: c

Section Ref: The Demographic Transition

39. Which of the following factors affects the total fertility rate for human populations today?

- a) availability of family planning services
- b) cultural and religious traditions
- c) governmental policies
- d) all of these

Ans: d

Section Ref: Demographics of Countries

40. Why are high fertility rates generally encouraged in developing countries?

- a) Children contribute to the family's livelihood.
- b) Children must care for aging parents.
- c) Male children are culturally more desirable, so families continue to have children until male children are born.
- d) All of these.

Ans: d

Section Ref: Culture and Fertility

41. What are family planning services?

- a) are generally more available in developing countries than in developed countries
- b) have resulted in about 70% of married women using contraceptives.
- c) provide information on reproductive physiology and contraceptive methods
- d) force people to limit family size

Ans: c

Section Ref: Family Planning Services

42. How does increasing education result in a decrease in total fertility?

- a) decreases the marriage age
- b) delays the age at which women have their first child
- c) decreases access to contraceptives
- d) leads to a greater understanding of traditional and religious beliefs

Ans: b

Section Ref: The Social and Economic Status of Women

43. In Sri Lanka, the average age at marriage is 25, and the average number of children born per woman is 2.0. In Bangladesh, the average age at marriage is 17, the average number of children born per woman is 3.0. Which of the following conclusions is supported by these data?
- a) The earlier a woman marries, the more children she is likely to have.
  - b) The more highly educated the woman, the fewer children she is likely to have.
  - c) The doubling time of the Bangladesh population is 58 years at its current rate of natural increase.
  - d) The earlier a woman marries, the fewer children she is likely to have.

Ans: a

Section Ref: The Social and Economic Status of Women

44. In most developing nations, a higher percentage of women than men are illiterate. What might be the reason for this?
- a) Fewer women than men attend school.
  - b) Because sons are more highly prized than daughters, girls are often kept at home rather than being sent to school.
  - c) In many societies women do not have the same rights, opportunities or privileges as men and that situation often applies to education.
  - d) To varying degrees, all of the above contribute to higher levels of illiteracy among women in developing nations.

Ans: d

Section Ref: The Social and Economic Status of Women

45. Which of the following statements refers to urbanization?
- a) Growth of cities is faster in developing countries than in developed countries.
  - b) About 75% of the global population is housed in cities.
  - c) Urbanization results in fewer employment opportunities in developed countries as compared to rural areas.
  - d) Urbanization refers to the migration of city people to the country to enjoy country living.

Ans: a

Section Ref: Urbanization

46. To what can the young age structure of urban areas be attributed?

- a) high birth rates in urban areas
- b) influx of young people from rural areas
- c) high death rates in urban areas
- d) the presence of more females than males in urban areas

Ans: b

Section Ref: Urbanization

47. Which of the following best describes an urban brownfield?

- a) vacant house lots that are overgrown with weeds and vegetation
- b) community gardens established by neighborhood organizations
- c) meadows that are earmarked for industrial development
- d) abandoned factories that may be contaminated from past uses

Ans: d

Section Ref: Environmental Problems of Urban Areas

48. What is one way in which urban areas in developing nations differ from urban areas in highly developed nations?

- a) Urban areas in developing nations have more females than males than urban areas in highly developed nations.
- b) Urban areas in developing nations have the worst air pollution in the world, including urban areas in highly developed nations.
- c) Urban areas in developing nations are growing at a slower rate than urban areas in highly developed nations.
- d) Urban areas in developing nations have fewer "top 10 largest cities" than urban areas in highly developed nations.

Ans: b

Section Ref: Environmental Problems of Urban Areas

49. What is the impact of urban development on waterways?

- a) It reduces runoff into rivers and streams.
- b) It increases runoff into rivers and streams.
- c) It reduces pollution levels in rivers and streams.
- d) It reduces bank erosion along rivers and streams.

Ans: b

Section Ref: Environmental Problems of Urban Areas

50. One alternative to urban growth is compact development, which is characterized by:

- a) more efficient land use

- b) reduced dependence on motor vehicles
- c) development on brownfield sites rather than in adjacent rural areas
- d) some combination of all of the above

Ans: d

Section Ref: Environmental Problems of Urban Areas

51. The city of Curitiba in Brazil is a good example of compact urban development. What percentage of its commuters use mass transit?

- a) 25
- b) 53
- c) 72
- d) 95

Ans: c

Section Ref: Case Study

### Essay Questions

52. What were the main ingredients of China's approach to population control in the latter part of the 20<sup>th</sup> century? Include comments on the incentives and penalties involved.

Suggested Ans: Recognizing that its rate of population growth had to decrease or the quality of life for everyone in China would be compromised, in 1971 the Chinese government began to pursue birth control policies seriously. It urged couples to marry later, increase spacing between children, and have fewer children. In 1979 China instigated a more aggressive plan to reduce the birth rate, announcing incentives to promote later marriages and one-child families. A couple who signed a pledge to limit themselves to a single child might be eligible for incentives like medical care and schooling for the child, cash bonuses, preferential housing, and retirement funds. Penalties were instituted, including fines and the surrender of all of these privileges, if a second child was born.

Section Ref: Chapter Opener

53. Explain why cockroach populations will not expand indefinitely and take over the entire world. Include in your discussion appropriate definitions of population growth terminology such as: exponential growth, carrying capacity, and resistant factors.

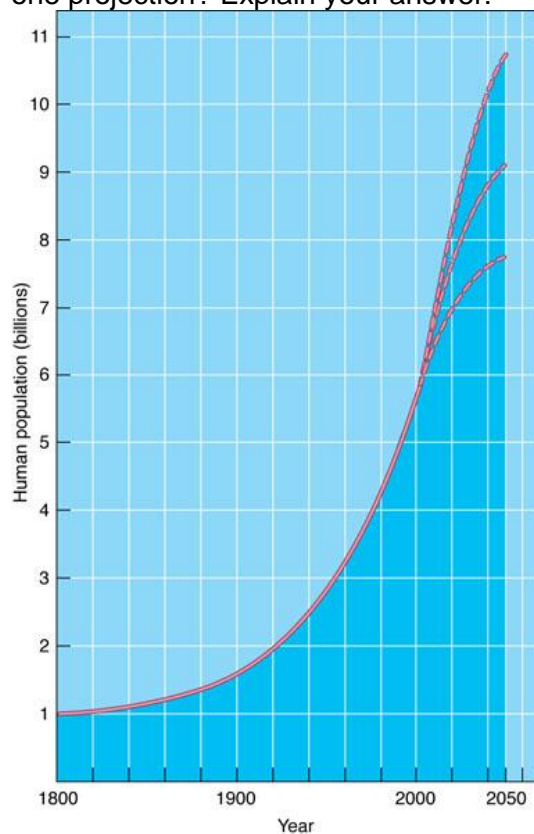
Suggested Ans: Cockroach populations exhibit exponential growth, which is accelerating population growth that occurs when optimal conditions allow a constant reproductive rate over a period of time. When the cockroach population grows exponentially, the larger the population gets, the faster it grows (J curve). However, environment resistance factors limit growth of the population. These factors include such unfavorable environmental conditions as the limited availability of food, water, shelter, and other essential resources (resulting in increased



competition) as well as limits imposed by disease and predation. As the number of individuals in a population increases, so does environmental resistance, which acts to limit population growth. The population of roaches would level at the carrying capacity appropriate for the local environment. The carrying capacity is the maximum number of individual of a given species that a particular environment can support for an indefinite period, assuming there are no changes in the environment.

Section Ref: Population Ecology

54. The graph below indicates three UN projections for population growth. Why is there more than one projection? Explain your answer:



Suggested Ans: Each of the assumptions is based upon a different fertility rate. The lowest projection assumes a decline in the TFR to 1.5. The highest one indicates a decline in the TFR to 2.5. The middle one is the one that most scientists feel is the most realistic.

Section Ref: Projecting Future Population Numbers

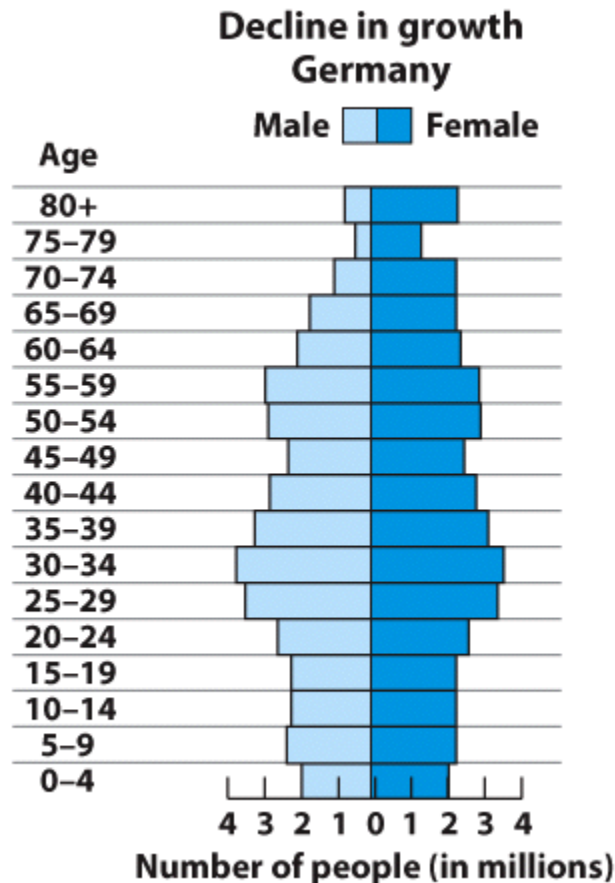
55. Who was Thomas Malthus and what were his ideas about human population growth? Was he correct or not? Justify your answer.

Suggested Ans: Thomas Malthus was a 19<sup>th</sup> century British economist who was one of the first people to recognize that the human population cannot increase indefinitely. He correctly pointed out human population growth is not always desirable because it can exceed the food supply

resulting in famine, disease and war. Since Malthus's time, the human population has increased from 1 to 6 billion. Scientific advances have allowed food production to keep pace with population growth. Malthus may ultimately be correct in his ideas because we do not know if our increase in food production is sustainable.

Section Ref: Human Population Patterns and Demographics

56. The overall shape of an age structure diagram indicates whether the population is increasing, stable, or shrinking. Consider this age structure diagram:



- Describe all aspects of the age structure diagram including distribution of people by gender, age categories, and the projection size of the population.
- Identify and discuss factors that contribute to a population with this age structure.

Suggested Ans:

- This diagram shows a population that is slightly decreasing in size. The diagram is divided vertically with no significant differences between the percentage of males on the left and females on the right. The bottom third of the diagram represents pre-reproductive individuals between 0 and 14 years of age. This population is at about 3.8–4.0% for each gender. The middle third, reproductive individuals between 15 and 44 years, indicates the largest %. The top third, post reproductive individuals 45+ years are the smallest width implying a smaller population in this age category.
- In the declining population model, represented by first world countries, with higher education, wide-spread birth control and a structure of society that promote careers and delayed

reproduction.

Section Ref: Age Structure of Countries

57. To date, all highly developed and moderately developed countries with more advanced economies have gone through a progress or demographic transition. Describe the four steps in this process in terms of the impact birth and death rates have on population growth.

Suggested Ans: As countries become industrialized and urbanized, they go from having relative high birth and death rates to having relatively low birth and death rates. There are four stages in this process: the first stage is the pre-industrial stage in which birth and death rates are high and the population grows at a modest rate. Then as a result of improved health care, better food and water supplies, the population enters the transitional stage characterized by a lower death rate. The population grows rapidly because the birth rate is still high. The third demographic stage is the industrial stage characterized by a decline in birth rate, which slows the population growth despite a relative low death rate. Finally, low birth and death rates characterized the last stage. This is the post industrial stage when people are better educated and more affluent and the population grows slowly or not at all in this stage.

Section Ref: The Demographic Transition

58. Why is it impossible to precisely determine the Earth's carrying capacity for the human population?

Suggested Ans: Predicting future population numbers is difficult because human choices and values have to be factored into the assessment and the natural environmental constraints alone do not predict the level of population. If all the people in the population have equivalent material well being, then more resources are needed and fewer people can be supported. In other words, the more resources individuals consume the fewer people the Earth can support. Therefore the carrying capacity might support a larger population if each member of that population were more frugal with natural resources.

Section Ref: Environmental Resistance and Carrying Capacity, Projecting Future Population Numbers

59. Discuss ways that the total fertility rate (TFR) can be reduced and identify the cultural values that make this process more complicated.

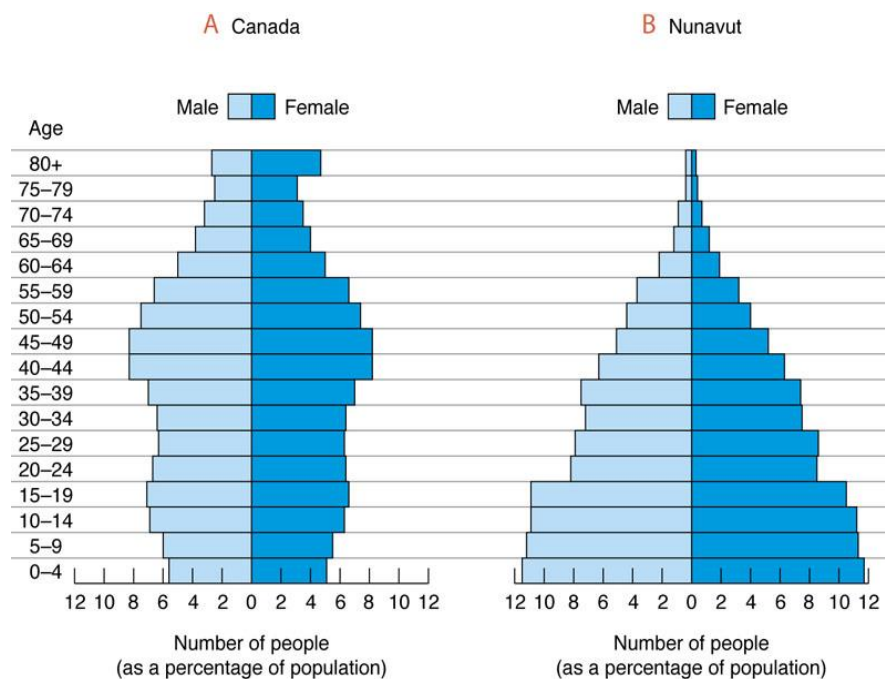
Suggested Ans: Education for women, delaying marriage until the age of 25, and family planning services that enable men and women to limit their family size, safeguard individual health rights, and improve the quality of life for themselves and their children are ways to reduce the TFR. High fertility rates are traditional in many cultures, and in some developing countries children play important economic and societal roles. Also many cultures place a higher value on male children than female children, and religious values are another aspect of culture that affect TFRs.

Section Ref: Demographics of Countries

60. Discuss ways in which family planning services may be used effectively to reduce total fertility rates.

Suggested Ans: Family planning services provide information on reproductive physiology and contraceptives, as well as the actual contraceptive devices, to those who wish to control the number of children they produce or to space their children's births. Family planning programs are most effective when they are designed with sensitivity to local social and cultural beliefs.  
Section Ref: The Demographic Transition

61. Compare the age-structure pyramid of Canada as a whole with that of the territory of Nunavut. What do they show about the current population of the two areas? What do they suggest about future population structure?



Suggested Ans: On the national pyramid the natural birth rate for Canada is contracting, illustrating that the population growth resulting from natural births in the country is declining. The current birth rate in Canada is just over 1.5 children for every woman, whereas the replacement level, above which the aging process would stop, is 2.1 children per woman. In Nunavut, however, the birth rate contrasts with national trends. The pyramid for Nunavut has a broad base, indicating a high proportion of the population is in their pre-reproductive stages of life. This implies that the population in Nunavut will see a rapid rate of population growth and a low proportion of older people. The pyramid shape also shows a compression in the number of individuals in their late teens and early twenties, showing a tendency for people to move out of the area at this age. This burst in population growth in Nunavut will be accompanied by an increase in economic, social, and environmental needs.

Section Ref: Age Structure of Countries

62. The two pictures below show people who traditionally do most of the agricultural work. What do these pictures tell us about the relationship between culture, the economic state of women, and the TFR?



Suggested Ans: In the picture on the right, women do most of the work, therefore, they have less education than the men do. They tend to be valued primarily for their ability to have children especially sons. The TFR rate in these countries tends to be high. On the left, since the man is working in the field there is a greater chance that the females will be able to attend some school. Studies have shown that education of females is one of the best way to reduce TFR.

Section Ref: The Demographic Transition

63. The fast pace of urban growth in developing nations has outstripped the limited capacity of many cities to provide basic services. Discuss the serious challenges that cities in developing nations are facing.

Suggested Ans: Cities in developing countries are facing the challenges of homelessness, substandard housing (slums and squatter settlements), poverty; exceptionally high unemployment; heavy pollution; and inadequate or nonexistent water, sewage, and waste disposal. Rapid urban growth places strain school tax bases, medical facilities, transportation capacity and other infrastructure systems. Malnutrition and illiteracy emerge in light of the shortcomings.

Section Ref:

64. One of the problems of urbanization in developing countries is a growing volume of garbage. How does the city of Curitiba in Brazil deal with that problem?

Suggested Ans: Curitiba has created a labour-intensive garbage purchase program, in which poor people exchange filled garbage bags for bus tokens, surplus food (eggs, butter, rice, and beans), or school notebooks. This program encourages garbage pickup from the unplanned

shantytowns (which garbage trucks can't access) that surround the city. Curitiba supplies more services to these unplanned settlements than most cities do. As well as dealing with garbage problems, it also tries to provide water, sewer, and bus service for them.

Section Ref: Case Study

65. Discuss the environmental problems associated with urban areas. Include in your discussion: How urban areas have affected land-use patterns and destroyed wildlife habitat.

Suggested Ans: Growing urban areas affect land-use patterns. Suburban sprawl that encroaches into former forest, wetland, desert, or agricultural land destroys or fragments wildlife habitat. Portions of Calgary, for example, are former wetlands. The expanding suburbs swallow natural areas and farmland. In addition, most workers in cities have to commute many kilometres through traffic-congested streets from the suburbs where they live to downtown areas where they work. Because development is so spread out in the suburbs, automobiles are a necessity to accomplish everyday chores. This dependence on motor vehicles as our primary means of transportation increases air pollution and causes other environmental problems. Cities also affect water flow because they cover the rainfall-absorbing soil with buildings and paved roads, which increases the rate of runoff. The urban runoff carries with it a number of pollutants such as fertilizers, garbage, oil, gas, and pesticides. Released into rivers and streams they can cause serious damage to the aquatic environment.

Section Ref: Environmental Problems of Urban Areas