Chapter 20—The Environment and Human Health

MULTIPLE CHOICE

1. Which of the following pollutants is caused by poor sanitation and can lead to gastrointestinal infections?
   a. bacteria in food  
   b. pesticides in food  
   c. lead in water  
   d. particulate matter in water
   Ans: A  DIF: 1  REF: 1  OBJ: 1

2. Dust storms, volcanoes, and wildfires are all
   a. causes of pollution due to human activities.  
   b. natural events that do not cause pollution.  
   c. causes of pollution people can control.  
   d. natural causes of pollution.
   Ans: D  DIF: 1  REF: 1  OBJ: 3

3. Air pollution is a major health problem caused by the burning of fuels in
   a. vehicles.  
   b. home furnaces.  
   c. power plants and factories.  
   d. All of the above
   Ans: D  DIF: 1  REF: 1  OBJ: 3

4. Much of the pollution in the environment is a result of
   a. the use of too much water.  
   b. the use of landfills.  
   c. inadequate waste disposal.  
   d. newer pollution-control devices used at factories.
   Ans: C  DIF: 1  REF: 1  OBJ: 4

5. Each year, most of the cases of organophosphate poisoning occur in people who are
   a. applying the chemical to crops.  
   b. eating fruit and vegetables with chemical residues.  
   c. inhaling the chemical while working in gas stations.  
   d. working in factories with various chemicals.
   Ans: A  DIF: 1  REF: 1  OBJ: 3

6. Which of the following pathogens have made a cross-species transfer to humans?
   a. influenza virus  
   b. hantavirus  
   c. West Nile virus  
   d. All of the above
   Ans: D  DIF: 1  REF: 2  OBJ: 3

7. Most infectious diseases are transmitted through
   a. water.  
   b. air.  
   c. soil.  
   d. people.
   Ans: A  DIF: 1  REF: 2  OBJ: 1
8. Which of the following is an environmental change that scientists believe may increase the areas where malaria occurs?
   a. draining wetlands
   b. soil erosion
   c. destroying habitats
   d. climate change
   ANS: D  DIF: 1  REF: 2  OBJ: 2

9. Which of the following is an environmental change that may result in more pathogens making a cross-species transfer to humans?
   a. polluting water with lead
   b. soil erosion
   c. destroying habitats
   d. climate change
   ANS: C  DIF: 1  REF: 2  OBJ: 2

10. Human immunodeficiency virus is considered an emerging virus because it
    a. had been controlled until recently.
    b. was previously unknown.
    c. developed from two other viruses.
    d. has become resistant to antibiotics.
    ANS: B  DIF: 1  REF: 2  OBJ: 3

11. Which of the following pollutants is found in vehicle exhaust, burning waste, fires, and tobacco smoke?
    a. particulate matter
    b. lead
    c. coal dust
    d. pesticides
    ANS: A  DIF: 1  REF: 1  OBJ: 3

12. Two diseases that can be caused directly by pollution are
    a. measles and tuberculosis.
    b. lead poisoning and lung cancer.
    c. cholera and river blindness.
    d. colds and flu.
    ANS: B  DIF: 1  REF: 1  OBJ: 1

13. Toxicology is the study of the harmful effects of
    a. substances on organisms.
    b. viruses on organisms.
    c. pollutants on the environment.
    d. antibiotics on viruses.
    ANS: A  DIF: 1  REF: 1  OBJ: 2

14. After an outbreak of an illness, scientists use epidemiology to try to find
    a. the origin of the disease.
    b. how the disease spreads.
    c. how to prevent the disease from spreading.
    d. All of the above
    ANS: D  DIF: 1  REF: 1  OBJ: 2

15. Naturally occurring pollutants can become hazardous to health when they are
    a. introduced into food.
    b. introduced into water.
    c. above normal levels.
    d. used by industry.
    ANS: C  DIF: 1  REF: 1  OBJ: 3
16. Which of the following pollutants are added to air by burning fuels for vehicles?
   a. carbon monoxide and many kinds of particulates
   b. organophosphates and many kinds of particulates
   c. carbon monoxide and organophosphates
   d. radon and heavy metals

   ANS: A  DIF: 1  REF: 1  OBJ: 3

17. Which of the following statements is true about pollutants from waste disposal?
   a. Laws regulating waste disposal are strictly enforced.
   b. Old landfills still prevent any wastes from leaking.
   c. Waste incineration plants no longer emit toxic products.
   d. Many communities release raw sewage into a river or the ocean after a heavy rain.

   ANS: D  DIF: 1  REF: 1  OBJ: 4

18. The environment is an important factor in the spread of cholera and dysentery because
   a. air can carry the pathogens.
   b. water provides a habitat in which the pathogens breed.
   c. the pathogens reproduce in soil.
   d. the disease is transmitted by mosquitoes.

   ANS: B  DIF: 1  REF: 2  OBJ: 1

19. People’s actions cause some disease-causing bacteria to become
   a. unaffected by radiation.
   b. extinct.
   c. resistant to antibiotics.
   d. emerging viruses.

   ANS: C  DIF: 1  REF: 2  OBJ: 2

20. Which of the following environmental changes is most likely to lead to the spread of parasites
    such as hookworm?
    a. overuse of pesticides
    b. resistance to antibiotics
    c. overuse of antibiotics
    d. contaminated soil

   ANS: D  DIF: 1  REF: 2  OBJ: 2

21. An estimate of the probability of a negative effect caused by a substance is a(n)
    a. educated guess.
    b. response assessment.
    c. risk assessment.
    d. dose-response curve.

   ANS: C  DIF: 1  REF: 1  OBJ: 2

COMPLETION

1. Arsenic, cadmium, lead, and mercury are examples of pollutants called ________________.
   ANS: heavy metals
   DIF: 2  REF: 1  OBJ: 3
2. Pollution can cause illness indirectly because many pathogens breed in or are spread by polluted ________________.

ANS: water

DIF: 2  REF: 2  OBJ: 1

3. Pollutants that are used in agriculture and landscaping and might cause nerve damage, birth defects, and cancer in humans are ________________.

ANS: pesticides

DIF: 2  REF: 1  OBJ: 1

4. The chemical found in old paint and gasoline that can cause brain damage and learning problems is ________________.

ANS: lead

DIF: 2  REF: 1  OBJ: 1

5. DDT is known as a(n) ________________ pesticide because it breaks down slowly in the environment.

ANS: persistent

DIF: 2  REF: 1  OBJ: 3

6. The damage to health that results from exposure to a given dose is called ________________.

ANS: response

DIF: 2  REF: 1  OBJ: 2

7. Exposure to any amount of a chemical that is less than the ________________ dose has no adverse effect on health.

ANS: threshold

DIF: 2  REF: 1  OBJ: 2

8. In the case of humans, risk is the ________________ of suffering a disease, injury, or death.

ANS: probability

DIF: 2  REF: 1  OBJ: 2
9. The hantavirus and Ebola virus are examples of _______________ viruses.

   ANS: emerging
   DIF: 2       REF: 2       OBJ: 3

10. Pollutants that cause health problems because they become trapped in the tiny air sacs in the lungs (causing irritation) are called _________________.

   ANS: particulate matter
   DIF: 2       REF: 1       OBJ: 1

11. Radon is a radioactive gas that can become concentrated in buildings after it seeps in from _________________.

   ANS: granite bedrock
   DIF: 2       REF: 1       OBJ: 3

12. Construction of irrigation canals and dams has encouraged the spread of infectious diseases by increasing the habitat for ________________ such as mosquitoes and snails.

   ANS: vectors
   DIF: 2       REF: 2       OBJ: 2

13. Black lung disease is caused by ________________.

   ANS: coal dust
   DIF: 2       REF: 1       OBJ: 1

14. In order for people to get malaria, they must be bitten by an infected _________________.

   ANS: mosquito
   DIF: 2       REF: 2       OBJ: 2

15. Much of the pollution in our environment is a byproduct of inadequate _________________.

   ANS: waste disposal
   DIF: 2       REF: 1       OBJ: 4
16. An organism in which a pathogen lives all or part of its life is a(n) ________________, whereas an organism that transmits a disease-causing organism to humans is a(n) ________________.

ANS: host, vector

DIF: 2 REF: 2 OBJ: 2

SHORT ANSWER

1. Explain why the environment negatively impacts the people of developing countries more than it does people in developed countries.

ANS:
People in developing countries are more likely to live in crowded conditions with poor sanitation. There is often not enough water for basic needs, and the local water supply is often used for drinking, washing, and sewage disposal. The water is usually very polluted and is a good breeding ground for pathogens.

DIF: 3 REF: 2 OBJ: 1

2. On a graph, what type of curve shows the relative effect of various doses of a drug or chemical on an organism or organisms as determined by experiments?

ANS:
dose-response curve

DIF: 3 REF: 1 OBJ: 2

3. In the United States, what government agency formulates regulations to ban or allow pollution-causing substances when they pose a risk to human health?

ANS:
Environmental Protection Agency (or EPA)

DIF: 3 REF: 1 OBJ: 2

4. Explain how people can be exposed to industrial chemicals in their homes.

ANS:
Products made with toxic chemicals can give off harmful fumes. These products include building materials, carpeting, furniture, and cleaning fluids.

DIF: 3 REF: 1 OBJ: 3
5. Describe some ways that pollution is caused by inadequate waste disposal in the United States.

ANS:
Answers may vary. Sample answer: Waste that is not disposed of properly can pollute beaches, wastewater from cities can carry oil and dozens of toxic chemicals into waterways, waste incineration plants can emit toxic products into the air, mining can release toxic contaminants into streams and rivers, old landfills may leak, and many sewage treatment plants release raw sewage into waterways after heavy rains.

DIF: 3 
REF: 1 
OBJ: 4 

6. What are three different ways that infectious diseases can be spread?

ANS:
from person to person, by drinking water that contains the pathogen, and by a secondary host or vector such as a mosquito

DIF: 3 
REF: 2 
OBJ: 1 

7. Thousands of people in the tropics are killed each year by the incurable disease schistosomiasis. Explain how this disease is contracted.

ANS:
The water provides a habitat for the snail vector for the disease. When people bathe in the water, the snails transmit the disease to them.

DIF: 3 
REF: 2 
OBJ: 2 

8. Name four kinds of disease-causing bacteria that have developed a resistance to antibiotics and are therefore more difficult to control.

ANS:
some strains of tuberculosis bacteria and pneumonia bacteria, Salmonella, and E. coli

DIF: 3 
REF: 2 
OBJ: 2 

9. What environmental changes can lead to the spread of malaria?

ANS:
construction of irrigation canals and dams that provide habitats for mosquitoes; climate changes leading to increasing areas with warmer climates

DIF: 3 
REF: 2 
OBJ: 2
10. Emerging viruses can be caused by pathogens that have made cross-species transfers to humans. Explain what an emerging virus and cross-species transfer are.

ANS: An emerging virus is a virus that was previously unknown or that was unknown 100 years ago. Cross-species transfer is the movement of a pathogen from one species to another species.

DIF: 3 REF: 2 OBJ: 3

11. How might environmental changes increase the chances of emerging viruses making a cross-species transfer?

ANS: Answers may vary. Sample answer: As urban areas and farmland spread, humans move into ecosystems that may contain species of animals with viruses that might be transferred to humans. The more contact humans have with these animals, the more likely the chances of a virus making a cross-species transfer and becoming an emerging virus.

DIF: 3 REF: 2 OBJ: 3

12. A person is exposed to a toxic chemical in the environment. What factors affect the threat to that person’s health?

ANS: Answers may vary. Possible answer: the dose, the number of times a person is exposed, the person’s size, and how well the person’s body breaks down the chemical

DIF: 3 REF: 1 OBJ: 2

PROBLEM

1. West Nile virus is an emerging virus with a mosquito vector that infects humans, horses, and birds, as well as other animals. It can cause serious illness and death. Since most cases of the virus seem to occur in birds, your friend thinks that eliminating birds in your area will control the disease. Try to convince your friend that this is not a good idea and propose a better idea.

ANS: Answers may vary. Sample answer: Humans are infected with the disease by mosquitoes, not by birds. Also, other animals are infected by the virus. Mosquitoes could bite these animals and then bite humans. A better idea would be to try to reduce the number of mosquitoes in the area and try to avoid being bitten.

DIF: 3 REF: 2 OBJ: 2
2. Imagine you are going on a camping trip next week. You have heard that the area where you are going has had cases of hookworm, malaria, and schistosomiasis. You don’t believe it is really true, but what steps could you take to avoid getting these diseases? Explain how these steps can help protect you.

ANS:
Answers may vary. Sample answer: Prepare by taking insect repellant, long pants, extra socks, more than one pair of shoes, and shirts with long sleeves. While there, wear insect repellant and keep as much of the body covered with clothes as possible. Always wear shoes and don’t drink or wade in the water. The insect repellant and clothes help prevent the mosquito vector for malaria from biting. Wearing shoes and not drinking the water help prevent hookworm, which can be caught by walking barefoot or drinking contaminated water. Not wading in the water will prevent schistosomiasis, which has a snail vector.

DIF: 3    REF: 2    OBJ: 1

3. Your neighbors recycle aluminum, glass, cardboard, and newspapers, and never litter. They claim that they do not cause any pollution. You want to convince them that everyone causes pollution. What examples could you give them to prove your point?

ANS:
Answers may vary. Sample answer: The resources they use cause pollution. Burning fuel warms their home. Electricity for their home was produced by burning fuel in a power plant that causes pollution or by nuclear power that produces radioactive wastes. The products in their home were made using industrial chemicals and probably caused air and water pollution in the process. Clean water enters their home and polluted water leaves it. Unless they walk everywhere, whatever mode of transportation they use causes pollution.

DIF: 3    REF: 1    OBJ: 3

ESSAY

1. Describe the role of water as a factor in the spread of cholera and malaria.

ANS:
Cholera pathogens are introduced into water by human feces. The pathogens breed in the polluted water and infect humans when they drink the water. Malaria is caused by a parasitic protist that lives in mosquitoes. Humans get malaria when they are bitten by an infected mosquito. The mosquito vector lays her eggs in stagnant water. The more stagnant water that is available, the larger the population of mosquitoes can become and the greater the chance of a human being bitten.

DIF: 3    REF: 2    OBJ: 1
2. Pesticides, lead, particulate matter, coal dust, and bacteria in food are five types of pollutants. What are the sources for each pollutant and the possible health effects each pollutant can cause?

ANS:
Pesticides are used in agriculture and landscaping. The possible effects on humans include nerve damage, birth defects, and cancer. Lead is found in paint and gasoline. Many countries continue to use leaded gasoline and paint. Its effects on humans include brain damage and learning problems. Particulate matter is added to the environment by vehicle exhaust, burning waste, fires, and tobacco smoke. Particulates can cause respiratory damage, including asthma, bronchitis, and cancer. The source of coal dust is coal mining. Coal dust can cause black lung disease. Bacteria in food result from poor sanitation and poor food handling. The effects are gastrointestinal infections.

DIF: 3  REF: 1  OBJ: 1

3. What makes diseases caused by viruses difficult to treat and control? Why are some bacterial diseases becoming more difficult to treat?

ANS:
Diseases caused by viruses are difficult to treat and control because we don’t have many effective drugs to treat viral diseases, and the drugs we do have are only effective against certain viruses. Also, viruses evolve rapidly. Bacterial diseases are becoming more difficult to treat because the bacteria are evolving resistance to antibiotics.

DIF: 3  REF: 2  OBJ: 2