

Unit Nine Homework Questions

1. A specific location where pollution is introduced into surface water or groundwater:

- a) acid mine drainage
- b) point source
- c) secondary treatment
- d) cryptosporidium
- e) fecal coliform bacteria

2. Step in wastewater purification in which organic material is consumed by bacteria:

- a) acid mine drainage
- b) point source
- c) secondary treatment
- d) cryptosporidium
- e) fecal coliform bacteria

3. Intestinal parasite that causes flu-like symptoms and can be transmitted through unfiltered or inadequately filtered drinking water:

- a) acid mine drainage
- b) point source
- c) secondary treatment
- d) cryptosporidium
- e) fecal coliform bacteria

4. The "dead zone" in the northern Gulf of Mexico consists of a large ocean area depleted in _____. This problem appears to be caused by _____.

- a) oxygen; nitrogen from agricultural runoff
- b) carbon; industrial pollutants
- c) marine microorganisms; ozone depletion

Unit Nine Homework Questions

- d) oxygen; global warming
- e) chlorophyll; deforestation

5. The amount of phosphorus and nitrogen in groundwater probably would be greatest:

- a) in undisturbed forest land
- b) in agricultural land in the developed world
- c) in agricultural land in the developing world
- d) downhill from a petroleum refinery
- e) downhill from an urban population center

6. A severe outbreak of cryptosporidiosis occurred in Milwaukee, Wisconsin in 1993. This outbreak illustrates:

- a) the benefits of reusing waste water
- b) the potential danger of groundwater contaminated by industrial effluent
- c) the threat posed by bacteria resistant to existing antibiotics
- d) the importance of clean drinking water supplies
- e) pollution of surface water during flooding

7. All of the following activities contribute to sediment pollution except:

- a) farming
- b) winter-time application of road salt
- c) construction
- d) deforestation
- e) off-road vehicle use

8. All of the following are effective strategies for minimizing sediment pollution except:

Unit Nine Homework Questions

- a) trap eroded sediment at construction sites
- b) expose a minimum amount of land
- c) tailor development to natural contours
- d) provide protection for exposed soil
- e) maximize surface runoff from critical areas

9. The principle advantage of using wetlands for wastewater treatment is:

- a) the resulting water exceeds all drinking water standards
- b) a natural ecosystem replaces industrial methods for secondary and advanced treatment
- c) it removes dioxin and other pollutants in the sediment of the wetland
- d) the method eliminates the production of methane, which contributes to global warming
- e) it replaces all need for a centralized wastewater treatment facility

10. Groundwater pollution is often difficult to treat because the pool is usually _____ and the rate of throughput is usually _____.

- a) small; slow
- b) small; fast
- c) subterranean; astronomical
- d) large; fast
- e) large; slow

11. Long Island, New York has a population of several million people, all of whom rely on groundwater for their water supply. Long Island illustrates many of the problems associated with groundwater pollution. Which of the following is not one of the threats to Long Island groundwater?

- a) leachate from solid waste disposal sites
- b) saltwater intrusion
- c) infiltration of salt used to de-ice winter roads

Unit Nine Homework Questions

- d) discharge from household septic tanks
- e) high-level nuclear waste disposal

12. The amount of the nutrients, phosphorus, and nitrogen in groundwater is usually:

- a) greater in agricultural regions than in natural forests
- b) the same in agricultural regions as in natural forests
- c) an indicator of soil fertility
- d) an indicator of industrial seepage
- e) lowest in areas with calcium-rich bedrock

13. The best definition of the term "water pollution" is:

- a) release of primary treated sewage into natural waters
- b) water unsuitable for human consumption
- c) overdrafting in coastal areas
- d) uncontrolled dumping of toxic industrial waste
- e) degradation of water quality

14. Coastal areas are susceptible to saltwater intrusion into groundwater. Saltwater intrusion usually becomes a threat when:

- a) serious storms hit the coast
- b) local water users remove more groundwater than is naturally replaced
- c) petroleum wells bring saline brines to the surface
- d) coastal erosion allows ocean water to get near freshwater aquifers
- e) heavy recreational activity occurs on beaches

15. The common test for the potential for disease transmission in water is:

Unit Nine Homework Questions

- a) measurement of the biological oxygen demand
- b) presence of cholera bacteria
- c) measurement of LDC's
- d) presence of coliform bacteria
- e) total dissolved solids

16. A septic tank:

- a) is a tank used to collect and treat drinking water
- b) is a tank in a sewage plant where chlorination of wastewater takes place
- c) stores human waste until it is emptied, for use where no sewage system is available
- d) treats waste water in rural households and can be considered as a private sewage treatment plant
- e) is a hermetically sealed container for storage of food

17. According to the Environmental Science text, what is the most critical water pollution problem in the world?

- a) lack of clean, disease-free drinking water
- b) thermal pollution
- c) municipal sewage
- d) sediment polluted waters
- e) industrial effluent

18. You are a scientist monitoring disease potential of wastewater treated at a sewage treatment plant. You are most concerned with the concentration of which of the following:

- a) oxygen-demanding waste (BOD)
- b) heavy metals
- c) radioactive materials

Unit Nine Homework Questions

- d) fecal coliform bacteria
- e) phosphorus

19. Rivers draining agricultural land or land that is being urbanized can quickly fill with sediment. This has the effect of _____ of flooding.

- a) increasing runoff, but decreasing the frequency
- b) increasing the magnitude and increasing the frequency
- c) increasing the magnitude and decreasing the frequency
- d) decreasing runoff and decreasing the magnitude
- e) increasing runoff and increasing the lag time

20. When nitrogen and phosphorus are added to a body of water, they alter the natural conditions because they:

- a) are necessary nutrients, usually scarce in nature
- b) lead to greater biological diversity
- c) are an additional food source
- d) kill algae, the base of the fresh water food chain
- e) cause a long-term increase in fish populations

21. Massive and rapid algae growth is stimulated by the addition of _____ to surface water bodies.

- a) oxygen and carbon dioxide
- b) leachate
- c) nitrogen and phosphorus
- d) aerobic bacteria
- e) toxic chemicals

Unit Nine Homework Questions

22. In general, the largest point sources of thermal water pollution are:

- a) manufacturing plants
- b) mass transit systems
- c) electrical generating plants
- d) petroleum refineries
- e) artificial waterways with dark-colored bottoms

23. Erosion and sediment pollution in rivers and streams result in all of the following ecological problems except:

- a) loss of fertility of farmland
- b) decrease in photosynthesis within the water
- c) smothering of fish eggs
- d) eutrophication
- e) increased flood hazard

24. What does B.O.D. stand for?

- a) Barometer of Decomposition
- b) Bacterial Oxygen Dependency
- c) Biodegradable Organic Damage
- d) Biological Oxygen Depletion
- e) Biochemical Oxygen Demand

25. Which of the following is not usually associated with eutrophication?

- a) algal blooms
- b) increased heavy metal concentrations
- c) reduced photosynthesis in the water column

Unit Nine Homework Questions

- d) increased nutrient concentrations
- e) reduced dissolved oxygen

26. What is the most easily accessible supply of fresh water in most locations around the world?

- a) surface water
- b) groundwater
- c) treated wastewater
- d) ocean water
- e) drinking water

27. By weight, the most abundant water pollutant is:

- a) toxic chemicals
- b) leachate from open dumps
- c) organic waste
- d) heavy metals
- e) sediment

28. The highest concentrations of nitrogen in surface and ground water generally are found in:

- a) forested areas
- b) urban areas
- c) rural areas
- d) suburban areas
- e) agricultural areas

Unit Nine Homework Questions

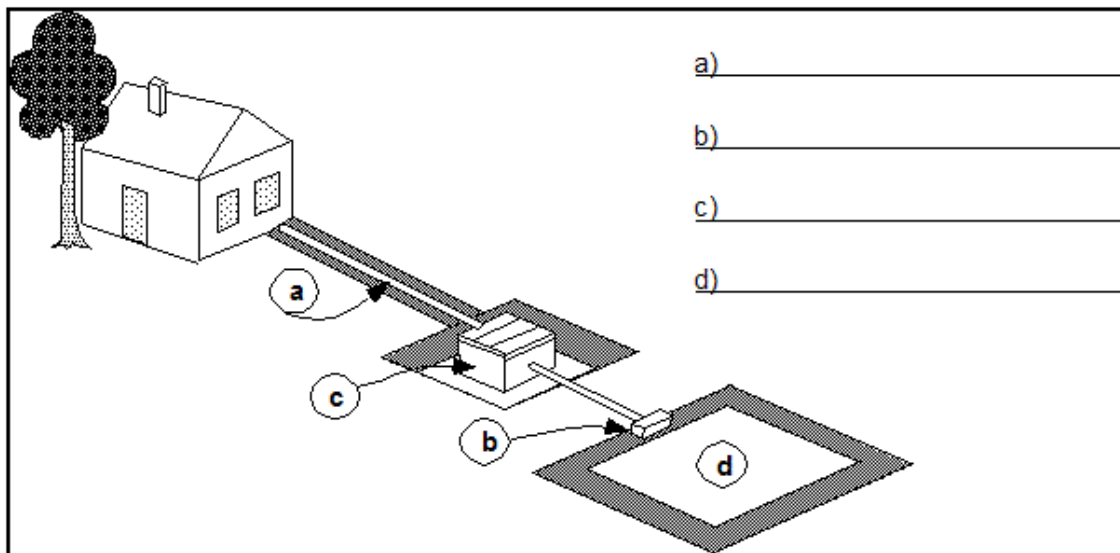
29. Water quality determination is based on all of the following except:

- a) effects on public health
- b) departure from the norm
- c) source of the water
- d) expected end use
- e) impacts on the ecosystem

30. What is cultural eutrophication?

- a) large scale oil spills in environmentally sensitive areas
- b) addition of fecal coliform bacteria to a body of water
- c) anthropogenic addition of nutrients to a body of water
- d) active decomposition of dissolved oxygen
- e) decay of cultural or moral standards

31. In the figure below, identify the following components of the household septic system:



32. Give two reasons why the release of large amounts of heated water discharged into rivers can be hazardous to the environment

Unit Nine Homework Questions

33. What are the similarities and differences between the problem of acid mine drainage and the problem of acid rain?
34. Name four steps that can be taken to reduce sediment pollution.
35. The intended use of water is important in determining the level of impurity that is acceptable. Why might water be considered severely polluted for household use, when the same water could be considered unpolluted when used for agricultural irrigation?
36. How does converting forested land to agriculture affect 1) runoff, 2) sediment yield, and 3) erosion?
37. Conventional wastewater treatment falls into three classes: primary, secondary and advanced treatment. Describe the three steps of treatment.
38. The definition for a "pollutant" given in the Environmental Science text is: "any biological, physical, or chemical substance which, in identifiable excess, is known to be harmful to other desirable living organisms." According to this definition, when does a chemical pesticide first become a "pollutant"?
39. What is the definition of water pollution?
40. List five major sources of pollution that threaten groundwater.
41. How is dissolved oxygen in a body of water related to biochemical oxygen demand?
42. Why are lakes and bays particularly vulnerable to thermal pollution?
43. As a newly hired urban planner you have to protect a growing urban area from soil erosion. List three basic sediment control practices that you can institute to minimize erosion.

Unit Nine Homework Questions

44. According to the Environmental Science text, four criteria are used to evaluate water pollution: 1) effects on public health, 2) departure from the norm, 3) expected end use, and 4) impacts on the ecosystem. Water from a pristine natural swamp is acidic, full of bacteria, and unsuitable for almost all human uses, but it is not polluted. By which of the criteria listed here is this determination made?
45. List five major sources of pollution that threaten surface water.
46. How do urban areas contribute to surface and groundwater pollution? List five different ways or processes.
47. The Illinois River (Critical Thinking Issue, Chap. 21, "How Can Polluted Waters be Restored?") suffers from degradation of its fish and waterfowl populations, high turbidity, low oxygen, and high levels of various pollutants. List the principal causes of the problems and some of the measures taken to solve them.
48. List three major categories of water pollutants.
49. Medical Lake in the state of Washington suffered a severe bout of eutrophication in the summer of 1971. What is eutrophication and how are the organisms living in the lake effected?
50. What is the difference between a point source and a non-point-source of pollution?
51. In a natural setting, these are components of soil, rock, or ecosystems that reduce the negative impacts of acid rain:
- a) atmospheric inversion
 - b) fugitive sources
 - c) photochemical smog
 - d) primary pollutants
 - e) buffers

Unit Nine Homework Questions

52. General class of pollution that characterizes urban area with frequent, strong sunshine
- a) atmospheric inversion
 - b) fugitive sources
 - c) photochemical smog
 - d) primary pollutants
 - e) buffers
53. This class of pollution is produced only at certain times, such as when the wind is blowing
- a) atmospheric inversion
 - b) fugitive sources
 - c) photochemical smog
 - d) primary pollutants
 - e) buffers
54. Atmospheric inversion conditions over urban areas pose a problem primarily because:
- a) the conditions are conducive to photochemical smog
 - b) pollutants are trapped and concentrated
 - c) the inhabitants can be cut off from oxygen
 - d) many sensitive plants and animals freeze to death
 - e) CFCs are concentrated and destroy protective ozone
55. Sulfur dioxide emissions are caused by:
- I. burning coal
 - II. automobile emissions
 - III. photochemical break-down of ozone in the stratosphere
- a) I only
 - b) II only

Unit Nine Homework Questions

- c) III only
- d) I and II
- e) I, II, and III

56. According to the textbook, the best way to reduce sulfurous smog is:

- a) scrubbers
- b) coal gasification
- c) conservation of fossil fuels
- d) fluidized-bed combustion
- e) improved education

57. The processes associated with acid rain or acid rain deposition include all of the following except:

- a) emission of sulfur dioxide and nitrogen oxides into the atmosphere via factory and automobile exhausts
- b) oxidation and complex reactions involving sulfur dioxide and nitrogen oxides in the atmosphere
- c) a rise in pH levels in lakes and streams
- d) "dry" deposition of sulfur dioxide or nitrogen oxides on vegetation, soil, etc. can later react with moisture to produce acid
- e) chemical reaction with limestone that damages buildings and monuments

58. Particulate pollutants introduced into the atmosphere may have which of the following effects?

- I. reflect incoming sunlight, lowering the temperature at the surface
 - II. absorb incoming sunlight, raising the temperature in the atmosphere
 - III. act as condensation nuclei, decreasing precipitation
- a) I only
 - b) II only
 - c) III only
 - d) I and II

Unit Nine Homework Questions

- e) I, II, and III

59. Nitrogen oxides (NO_x) are:

- a) a yellow-brown gas that contributes to photochemical smog
- b) a colorless and odorless gas that binds to hemoglobin in blood
- c) a colorless and odorless gas that damages the lungs
- d) a gas with a "rotten egg" odor that is highly toxic and corrosive
- e) a reactive gas produced, in part, by photochemical reaction of sunlight with various air pollutants

60. Ozone is of great benefit in the stratosphere but of great harm to humans in the lower troposphere. Which of the following is not an effect on people?

- a) strong eye irritant
- b) aggravates asthma
- c) reduces the ability of the circulatory system to transport oxygen
- d) injury to cells in the respiratory system
- e) coughing and chest discomfort

61. What is meant by a fugitive pollution source?

- a) air pollutants picked up from open areas exposed to wind
- b) minimum mileage (MPG) requirements for new cars in the U.S.
- c) pollutants from one or more controllable sites
- d) maximum levels of carbon monoxide in the air of major cities
- e) a well defined area within which are several sources of air pollutants

62. Tall smokestacks on power plants were designed to:

- a) allow exhaust to cool before entering the atmosphere

Unit Nine Homework Questions

- b) disperse pollutants, so they wouldn't cause harmful effects in the immediate area
- c) trap sulfur emissions
- d) augment the chimney effect in the area around the plant
- e) inhibit the reactions that form sulfuric acid

63. Which of the following is the least significant air pollutant (either primary or secondary) associated with driving cars and other vehicles?

- a) carbon monoxide
- b) nitrous oxides
- c) gaseous hydrocarbons
- d) ozone
- e) hydrogen fluoride

64. Sulfur dioxide is:

- a) a yellow-brown gas that contributes to photochemical smog
- b) a colorless and odorless gas that binds to hemoglobin in blood
- c) a colorless and odorless gas that damages the lungs
- d) a gas with a "rotten egg" odor that is highly toxic and corrosive
- e) a reactive gas produced, in part, by photochemical reaction of sunlight with various air pollutants

65. A pipe spilling industrial effluent into a river is an example of a(n):

- a) point source
- b) fugitive source
- c) area source
- d) mobile source
- e) polytoxic source

Unit Nine Homework Questions

66. How is photochemical smog produced?

- a) depletion of tropospheric ozone + SO_x
- b) petroleum production in urban areas
- c) incineration of toxic waste
- d) solar radiation + NO_x + organic compounds
- e) burning of coal in urban areas + SO_x

67. During a 15-minute time period, a marathon runner will take in as much sulfur dioxide pollution from the air as a person at rest will inhale in

- a) one hour
- b) two hours
- c) three hours
- d) four hours
- e) five hours

68. The pH of natural rainfall is _____; the pH of acid rain is _____.

- a) 6-8; greater than 9
- b) 5-6; less than 4.5
- c) 6-8; less than 1.5
- d) 5-6; less than 1.5
- e) 4-5; greater than 7

69. Secondary pollutants differ from primary pollutants in that they are not:

- a) as dangerous as primary pollutants
- b) emitted directly into the air as are primary pollutants

Unit Nine Homework Questions

- c) eliminated from the atmosphere as easily as are primary pollutants
- d) as abundant as primary pollutants
- e) natural components of the atmosphere

70. Hydrogen sulfide (H_2S) is:

- a) a yellow-brown gas that contributes to photochemical smog
- b) a colorless and odorless gas that binds to hemoglobin in blood
- c) a colorless and odorless gas that damages the lungs
- d) a gas with a "rotten egg" odor that is highly toxic and corrosive
- e) a reactive gas produced, in part, by photochemical reaction of sunlight with various air pollutants

71. Ozone (O_3) is:

- a) a yellow-brown gas that contributes to photochemical smog
- b) a colorless and odorless gas that binds to hemoglobin in blood
- c) a colorless and odorless gas that damages the lungs
- d) a gas with a "rotten egg" odor that is highly toxic and corrosive
- e) a reactive gas produced, in part, by photochemical reaction of sunlight with various air pollutants

72. Which of the following are the most significant fine particulate pollutants?

- a) fog
- b) fly ash
- c) sea salt particles
- d) sulfates and nitrates
- e) suspended asbestos

Unit Nine Homework Questions

73. According to the textbook, "Arctic haze" mainly comes from:

- a) North America
- b) the world's oceans
- c) the Arctic
- d) extraterrestrial sources
- e) Western Europe

74. Which of the following is a secondary pollutant and a major component of photochemical smog:

- a) sulfur dioxide
- b) ozone
- c) particulate matter
- d) asbestos
- e) gaseous hydrocarbons

75. Which of the following gases in the atmosphere increase the acidity of rainfall?

- I. CO_2
 - II. SO_2
 - III. NO_2
- a) I only
 - b) II only
 - c) III only
 - d) II and III
 - e) I, II, and III

76. Which of the following is a true statement about particulate matter in the atmosphere?

- a) it is introduced to the atmosphere only by human activity

Unit Nine Homework Questions

- b) it is primarily an effect of automobile emissions and photochemical reactions
- c) it amplifies incoming solar radiation
- d) its effects are limited to local atmospheric inversion episodes
- e) particles function as condensation nuclei, increasing the amount of precipitation

77. Acid surges are associated with accumulation of "_____ deposition".

- a) wet
- b) moist
- c) dry
- d) arid
- e) acid fog

78. Carbon monoxide is particularly dangerous to humans because:

- a) it damages the nervous system
- b) low concentrations affect healthy and sickly people equally
- c) its deleterious effects increase with decreasing altitude
- d) it prevents O₂ from reaching vital tissues
- e) all of these

79. Which of the following would tend to buffer (reduce) the effects of acid rain?

- a) granite underlying a lake
- b) thin soils
- c) addition of methyl mercury to lakes
- d) calcium-carbonate-rich soils
- e) replacement of tall smokestacks with short stacks at nearby sulfur point sources

Unit Nine Homework Questions

80. In the lower atmosphere, ozone is produced by:

- a) photochemical reactions
- b) emissions from coal plants
- c) ultraviolet-B radiation
- d) oxidation of CO₂
- e) reduction of natural hydrocarbons

81. Which of the following is not a primary pollutant from the burning of fossil fuels?

- a) chlorophyll
- b) particulate matter
- c) carbon monoxide
- d) hydrocarbons
- e) nitrogen oxides

82. Which of the following was an important factor in producing air pollution during the 2008 Summer Olympics in Beijing, China?

- a) coal-fired electrical power plants
- b) air stagnation caused by hills surrounding the city
- c) southerly winds
- d) coal used to heat homes in the city
- e) all of these were important factors

83. Which compound often neutralizes the acid in acid rain that falls in lakes?

- a) sulfur dioxide
- b) bicarbonate ion
- c) nitrous oxide

Unit Nine Homework Questions

- d) ozone
- e) carbon dioxide

84. Las Vegas has some of the most polluted air in the southwestern United States. Which of the following pollutants is the primary cause of the polluted air?

- a) photochemical smog
- b) ozone
- c) acid rain
- d) SO_2
- e) particulate matter

85. Which pollutant is most commonly associated with coal-fired electrical generation?

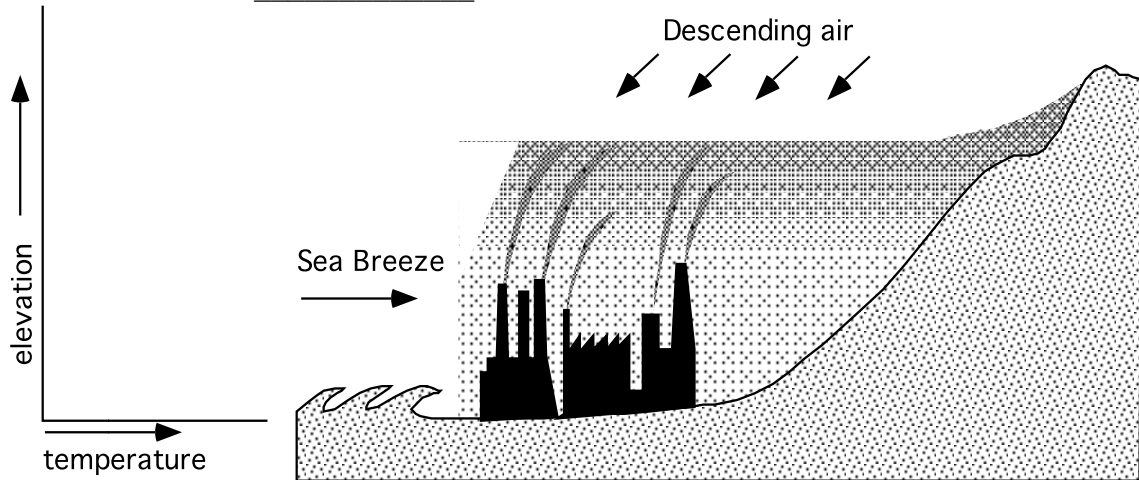
- a) CO
- b) NO_x
- c) O_3
- d) SO_2
- e) HC

86. Carbon monoxide (CO) is:

- a) a yellow-brown gas that contributes to photochemical smog
- b) a colorless and odorless gas that binds to hemoglobin in blood
- c) a colorless and odorless gas that damages the lungs
- d) a gas with a "rotten egg" odor that is highly toxic and corrosive
- e) a reactive gas produced, in part, by photochemical reaction of sunlight with various air pollutants

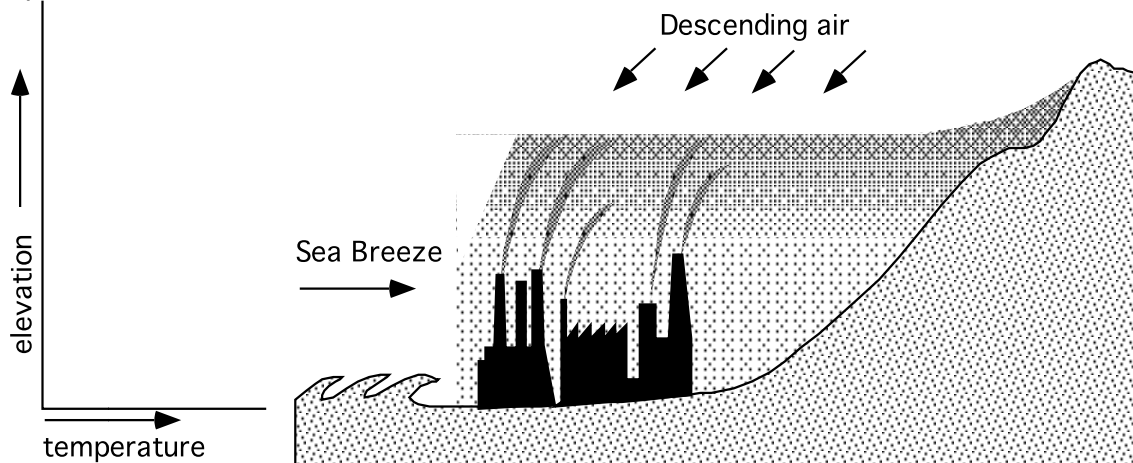
Unit Nine Homework Questions

87. In the figure below, pollution conditions are worst when _____; and at locations where _____.



- wind is slow and mixing height is high; distance from the coast to the mountains is large
- wind is slow and mixing height is low; distance from the coast to the mountains is large
- wind is fast and mixing height is high; distance from the coast to the mountains is small
- wind is fast and mixing height is low; distance from the coast to the mountains is large
- wind is slow and mixing height is high; distance from the coast to the mountains is small

88. In the city illustrated in the figure below, the pollution emission rate is 20 kg per m² per second, the wind is blowing onshore at 10 m per second, and the mixing height is 1000 m. Based on this information, what would the pollution concentration be at a point 5 km inland of the coast?



- 1 kg per m²
- 10 kg per m³

Unit Nine Homework Questions

- c) 10 kg
- d) 0.001 kg per m³
- e) 100 kg per m²

89. The development of photochemical smog is directly related to

- a) automobile use
- b) burning of coal in power plants
- c) burning of oil in power plants
- d) homes using electricity
- e) all of these

90. Match the following pH value with the substances in which they may have been measured.

- | | |
|-------------|-----------------------|
| pH=1 _____ | a) distilled water |
| pH=4 _____ | b) strong acid |
| pH=7 _____ | c) strong base |
| pH=13 _____ | d) acid precipitation |

91. Match each of the major air pollutants listed on the left with its definition or one of its characteristics listed on the right:

- | | |
|-------------------------|--|
| Sulfur Dioxide _____ | a. toxic gas with a rotten-egg odor |
| Nitrogen Oxides _____ | b. ozone is the main example of this |
| Carbon Monoxide _____ | c. combines with water to form sulfuric acid |
| Oxidants _____ | d. toxic gas released in aluminum production |
| Hydrocarbons _____ | e. emitted by automobiles as well as trees |
| Hydrogen Sulfide _____ | f. toxic gas that is colorless and odorless |
| Hydrogen Fluoride _____ | g. series of chemicals, including gas and particulate forms, emitted by burning fossil fuels |

92. List three different types of damage done by acid rain.

Unit Nine Homework Questions

93. Name the two principal pollutants that contribute to acid rain, and the main source of each.
94. Explain under what circumstances an atmospheric inversion occurs and how it can lead to pollution events.
95. List two natural conditions that help buffer (reduce) the effects of acid rain.
96. There are three main types of acid deposition events. One is precipitation (rain, snow, and ice). List the other two.
97. Under normal circumstances, UV penetration is greater nearer the equator than at the poles, however, Antarctica sometimes registers a higher reading than San Diego. How do you explain this?
98. Give an example of each of the following pollution sources: point source, fugitive source, area source.
99. Name two of the processes that lead to the accumulation and concentration of "Arctic haze".
100. Name the principal effect of acid rain on each of the following:
soils
trees
lakes
limestone monuments
101. Explain the term "secondary pollutant" and give an example.
102. Name the three major types of smog and list the principal cause of each.

Unit Nine Homework Questions

103. Natural rainfall is slightly acidic. Explain why.
104. Air pollutants are sometimes classified as either primary or secondary. Explain the difference and give an example of each.
105. This is an ailment caused by long-term exposure to air with high concentrations of soot or carbon-rich dust:
- a) formaldehyde
 - b) sick building syndrome
 - c) chimney effect
 - d) black lung disease
 - e) radon
106. This is a colorless and odorless gas released by some types of rock and associated with lung-cancer risk:
- a) formaldehyde
 - b) sick building syndrome
 - c) chimney effect
 - d) black lung disease
 - e) radon
107. Discomfort, symptoms, or disease reported by many occupants of the same structure:
- a) formaldehyde
 - b) sick building syndrome
 - c) chimney effect
 - d) black lung disease

Unit Nine Homework Questions

e) radon

108. Formaldehyde, a common and harmful indoor air pollutant, comes from:

- a) decay of radioisotopes in bedrock and soil
- b) out-gassing from particle board and other construction materials
- c) combustion of fossil fuels
- d) household insulation
- e) household solvents and cleaning fluids

109. What was the apparent cause of the large number of respiratory ailments reported at the Massachusetts Registry of Motor Vehicles after it opened in 1994?

- a) ozone
- b) radon gas
- c) global warming
- d) poorly designed ventilation system
- e) mass hysteria

110. Ozone is a natural component of the Earth's stratosphere as well as an element of photochemical smog. Ozone also can be an indoor air pollutant. Sources of ozone in homes or offices include:

- a) decay of radioisotopes in bedrock and soil
- b) combustion of fossil fuels
- c) electrolysis of tap water
- d) household solvents and cleaning fluids
- e) photocopying machines, printers, and other high-voltage electrical equipment

Unit Nine Homework Questions

111. Twelve days after a sample of radon gas (with a half-life of about four days) is emitted into a sealed room, _____ of the original amount remains.
- a) $1/2$
 - b) $1/3$
 - c) $1/8$
 - d) $1/12$
 - e) $1/16$
112. What is the principal disadvantage of bringing fresh outdoor air into a building to reduce concentrations of indoor air pollutants?
- a) the outdoor air usually is more polluted than the indoor air
 - b) decreased miles per gallon
 - c) increased heating and air conditioning costs
 - d) that method brings radon in the building
 - e) the cost of pumping in outdoor air is greater than filtering indoor air
113. One of the major objectives in designing a "green building" (as defined in your textbook) is to:
- a) make the building energy self-sufficient
 - b) provide space for vegetation on the rooftop and other areas
 - c) minimize indoor air pollutants, including chemicals and mold
 - d) provide heating by passive solar energy
 - e) provide low-income housing
114. The following statements about radon gas are all incorrect except:
- a) radon gas is colorless and non-toxic
 - b) radon gas is identified by the "rotten egg" odor of the gas
 - c) radon is radioactive waste leaked from nuclear power plants

Unit Nine Homework Questions

- d) exposure to radon gas can cause birth defects
- e) radon is a part of the decay chain from lead to uranium

115.Reduced air circulation on aircraft has all of the following effects, dangers, or tradeoffs except:

- a) increased CO₂ levels
- b) decreased fuel efficiency
- c) increased danger of the transmittal of bacterial infections
- d) decreased on-board humidity
- e) increased reports of headaches, fatigue, nausea, etc.

116.Which of the following is **not** a potentially significant source of radon contamination?

- a) rainfall, in regions of Canada and Scandinavia for example
- b) polished granite floor tile
- c) a bedrock substrate of shale
- d) household water from a well
- e) insulation and weatherization that tightly seals a house

117.Which of the following indoor air pollutants contains NO_x, CO, hydrogen cyanide, etc. and results in an estimated 43,000 deaths per year in the U.S. from lung cancer and heart disease?

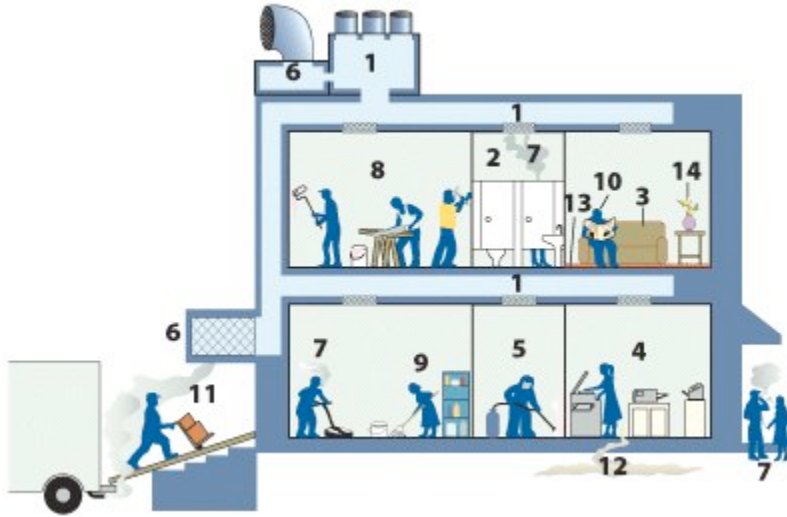
- a) mold
- b) cleaning solvents
- c) secondhand tobacco smoke
- d) asbestos
- e) formaldehyde and other preservatives

Unit Nine Homework Questions

118. One process that mobilizes indoor air pollutants is the 'chimney effect,' which:
- a) occurs in a building suffering from the 'sick building syndrome'
 - b) moves more radon through homes which burn wood for heat
 - c) occurs where buildings are warmer than the air around them or the rock below them
 - d) occurs in tall, air-conditioned buildings
 - e) concentrates radon in the lower floors of tall buildings
119. The combined effects of exposure to radon gas and smoking are greater than the sum of the effects separately. This is an example of:
- a) biomagnification
 - b) symbiotic effect
 - c) body burden
 - d) synergy
 - e) carcinogeny
120. Which of the following groups are most susceptible to indoor air pollutants?
- a) old people
 - b) children
 - c) people with a suppressed immune system
 - d) people with respiratory diseases
 - e) all of these

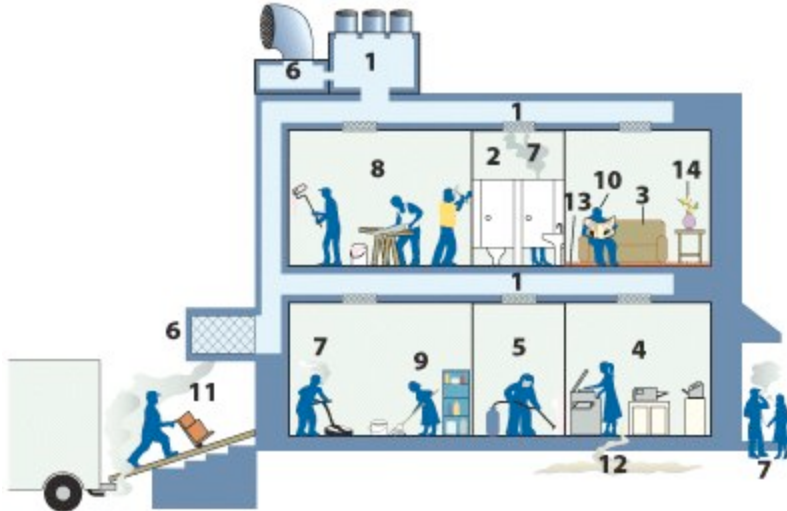
Unit Nine Homework Questions

121. In the figure below, which source of indoor air pollution is shown by #7?



- a) secondhand tobacco smoke
- b) dust mites
- c) carbon monoxide
- d) formaldehyde
- e) fecal coliform bacteria

122. In the figure below, which indoor air pollutant can be emitted by fax machines, computers, printers, and copiers, as illustrated by #4?

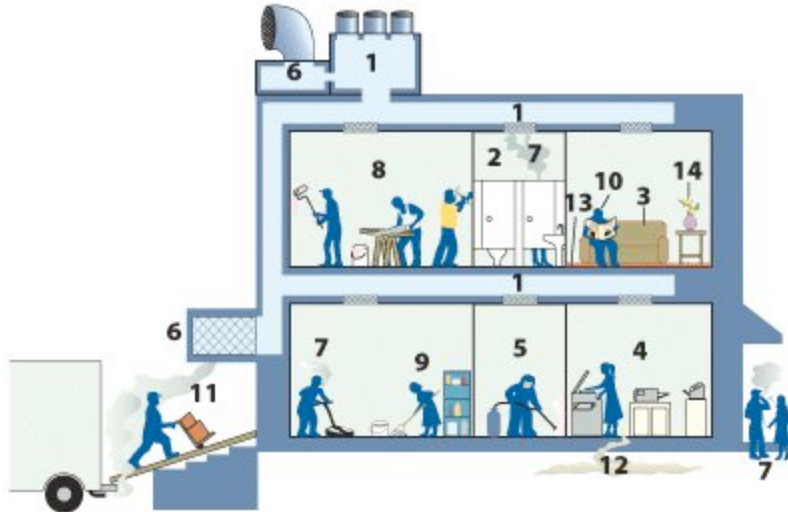


- a) formaldehyde
- b) carbon dioxide

Unit Nine Homework Questions

- c) secondhand smoke
- d) radon
- e) ozone

123.A illustrated by #1 in the figure below, heating, ventilation and air conditioning units can themselves be a source of indoor air pollutants, including:



- a) secondhand smoke
- b) dust mites and pollen
- c) bioeffluents
- d) mold, bacteria, or carbon monoxide
- e) fecal coliform bacteria

124.Black lung disease is associated with long-term exposure to:

- a) ozone
- b) radon gas
- c) sick buildings
- d) high concentrations of petroleum vapor
- e) high concentrations of carbon-rich particles in the air

Unit Nine Homework Questions

125. The number of deaths caused by lung cancer due to exposure to radon is comparable to the number of deaths caused by _____ in the U.S. each year.
- a) plane crashes
 - b) lightening
 - c) car accidents
 - d) volcanic eruptions
 - e) old age
126. All of the following are methods to reduce the concentration of radon in a home **except**:
- a) sealing cracks or openings in foundation
 - b) ventilation or suction beneath foundation
 - c) better insulation and weatherization
 - d) filtering of well water
 - e) replacement of inappropriate building material
127. Which of the following is **not** a potential source of radon:
- a) bedrock
 - b) water wells
 - c) building materials
 - d) soil
 - e) space heaters
128. Radon gas is considered a threat to human health because it can:
- a) bond with hemoglobin in the blood
 - b) cause lung cancer

Unit Nine Homework Questions

- c) mutate cells and causes birth defects
- d) become toxic when concentrated in well-insulated homes
- e) emit alpha particles, which cause birth defects

129. In a large office building, a number of employees begin complaining of headaches, dizziness, and nausea at about the same time. This is an example of:

- a) Legionnaires' disease
- b) high concentrations of radon gas
- c) chimney effect
- d) mass psychosis
- e) sick building syndrome

130. How could a homeowner reduce the "chimney effect" in their home?

- a) sub-slab construction
- b) keep house warm
- c) insulate walls
- d) caulk windows and doors
- e) install an exhaust fan on the roof

131. Asbestos is hazardous to human health because:

- a) if releases toxic fumes
- b) if trapped in the lungs, it decays and damages DNA
- c) it is composed of small fibers, which damage skin or lung tissue
- d) if trapped in the lungs, it can be carcinogenic
- e) it is a potent toxin, damaging the neurological systems of humans and animals

Unit Nine Homework Questions

132. Indoor air pollutants include all the following except:

- a) mold and bacteria
- b) formaldehyde
- c) polonium
- d) ozone
- e) All of these are indoor air pollutants

133. High concentrations of indoor air pollution are most likely found in:

- a) homes constructed to be energy-efficient
- b) mobile homes
- c) homes with many pieces of hardwood furniture
- d) office buildings
- e) the cellar of any kind of building

134. There is a natural background radiation received by every human and animal. The range is between 100 and 250 millirem per year. The natural range is so wide because of local variations in:

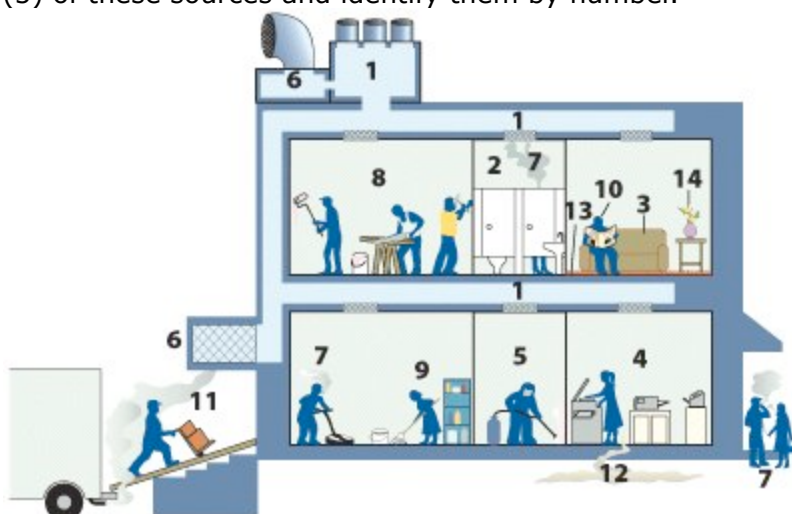
- I. vegetation
 - II. geology
 - III. elevation
- a) I only
 - b) III only
 - c) I and II
 - d) II and III
 - e) I, II, and III

135. Asbestos is _____. It is considered a dangerous substance because _____.

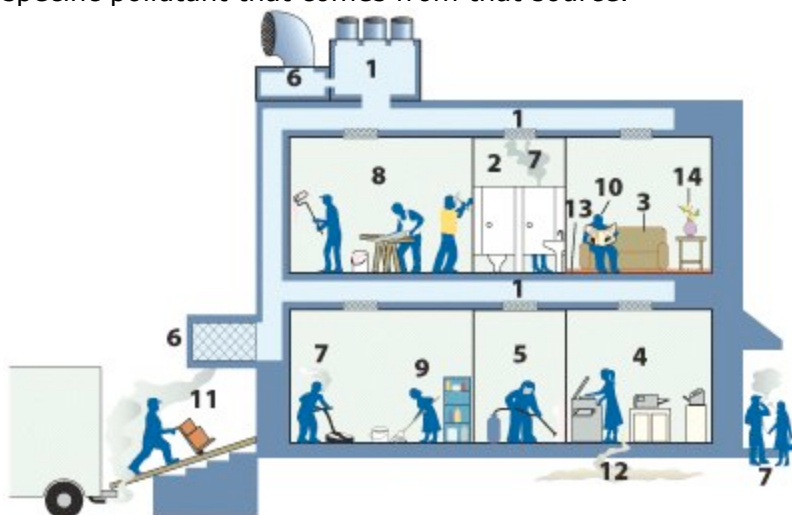
Unit Nine Homework Questions

- a) a chemical substance; it has toxic effects on the respiratory system
- b) a natural mineral than has very thin fibers; these fibers can become trapped in the lungs and cause cancer
- c) a naturally occurring byproduct of carbon combustion; it is known to cause lung cancer
- d) a commonly used building material; it been found to emit potentially dangerous radiation
- e) a common insulator; when released into the air, it is highly toxic to humans and animals

136. The figure below illustrates 14 potential sources of indoor air pollution. Pick any five (5) of these sources and identify them by number.



137. The figure below illustrates 14 potential sources of indoor air pollution. Pick any five (5) of these sources and (A) identify them by number, and (B) name at least one specific pollutant that comes from that source.



Unit Nine Homework Questions

138. In a large office building, a number of employees begin complaining of headaches, dizziness, and nausea at about the same time. What is this condition called? List some possible causes for the symptoms.
139. Houses built on a certain type of granite have a greater danger of high radon concentrations than other houses nearby that are built on a certain type of limestone bedrock. Does this imply that all the houses on the granite have high concentrations of radon? Why or why not?
140. What was the apparent cause of the large number of respiratory ailments reported at the Massachusetts Registry of Motor Vehicles after it opened in 1994?
141. List four common indoor air pollutants and one possible source for each.
142. Is radon gas a natural or artificial substance? Where does it come from?
143. Why are concentrations of indoor air pollutants generally greater than those found outdoors?
144. List four general strategies for controlling indoor air pollution.
145. Name three ways to reduce the concentrations of radon gas in a home.
146. Why is the risk of lung cancer greater for (1) smokers exposed to radon gas than the sum of the risks for (2) smoking and (3) exposure to radon?
147. List three pathways (vectors) for radon gas to enter a home. List one remedial course of action for each vector.
148. What is 'sick building syndrome'?

Unit Nine Homework Questions

149. What are dust mites, where do they live, and why are they classified as an indoor air pollutant.
150. Environmental tobacco smoke ("secondhand smoke") is a major category of indoor air pollution resulting in over 40,000 deaths per year in the U.S. alone. What are the two major health threats associated with environmental tobacco smoke?