# Practice Test 2

# AP® Environmental Science Exam

## SECTION I: Multiple-Choice Questions

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.**

**Instructions**

### At a Glance

**Total Time**
1 hour and 30 minutes
**Number of Questions**
80
**Percent of Total Grade**
60%
**Writing Instrument**
Pencil required

Section I of this examination contains 80 multiple-choice questions. Fill in only the ovals for numbers 1 through 80 on your answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, completely fill in the corresponding oval on the answer sheet. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Here is a sample question and answer.

Sample Question          Sample Answer

Chicago is a            Ⓐ ● Ⓒ Ⓓ

    (A) state
    (B) city
    (C) country
    (D) continent

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all the multiple-choice questions.

**About Guessing**

Many candidates wonder whether or not to guess the answers to questions about which they are not certain. Multiple-choice scores are based on the number of questions answered correctly. Points are not deducted for incorrect answers, and no points are awarded for unanswered questions. Because points are not deducted for incorrect answers, you are encouraged to answer all multiple-choice questions. On any questions you do not know the answer to, you should eliminate as many choices as you can, and then select the best answer among the remaining choices.

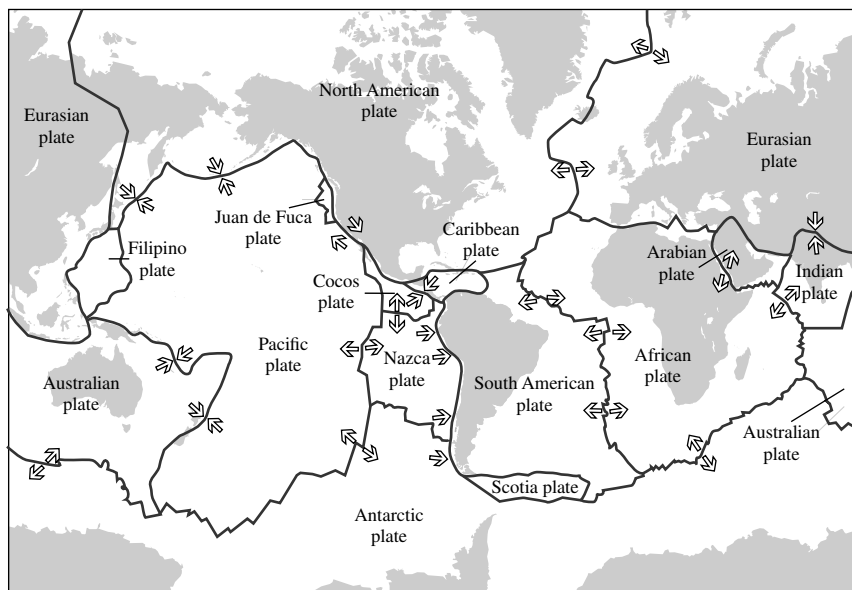**GO ON TO THE NEXT PAGE.**

# ENVIRONMENTAL SCIENCE
## Section I
## Time—90 minutes
## 80 Questions

**Directions:** Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case and then fill in the corresponding oval on the answer sheet.

**Questions 1 and 2 refer to the following map.**

The map below shows the major plate boundaries of the world and their boundaries and movement.
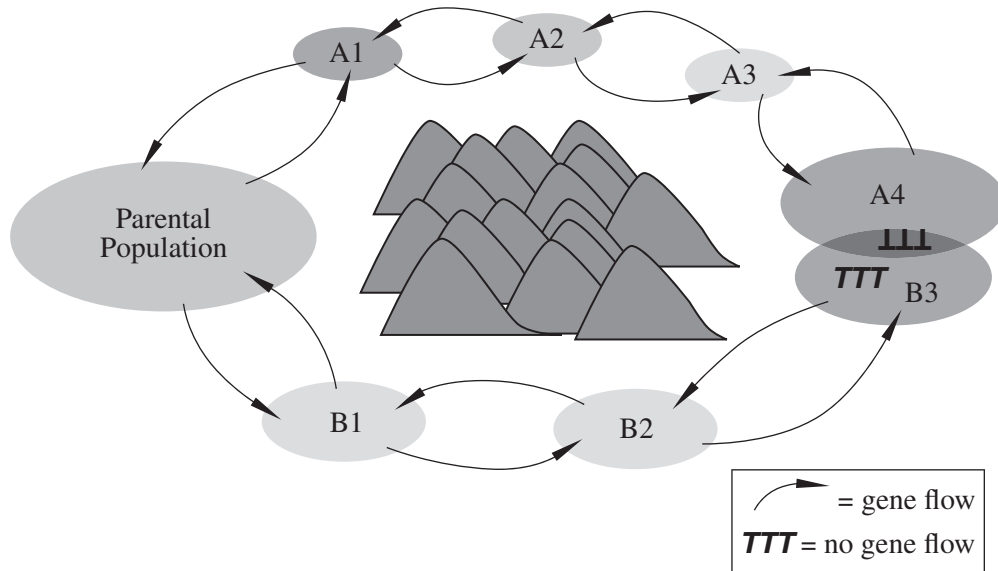


1. Which of the following plate boundaries most likely is characterized by seafloor spreading and rift valleys?

   (A) Nazca–South American boundary

   (B) Australian–Pacific boundary

   (C) Antarctic–Pacific boundary

   (D) African–Antarctic boundary

2. Which type of plate boundary typically results in mountain creation, island arcs, earthquakes, and/or volcanoes?

   (A) Convergent boundary

   (B) Divergent boundary

   (C) Transform boundary

   (D) Triple junction

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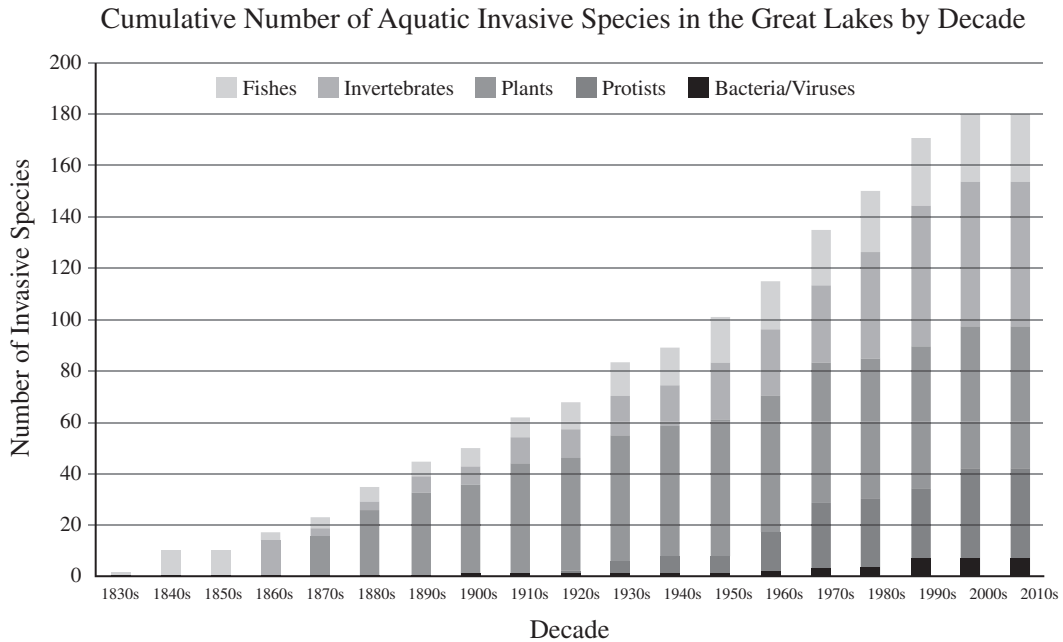**Questions 3 and 4 refer to the following information and diagram.**

A ring species is a connected series of neighboring populations, each of which can interbreed with the populations that neighbor it directly, but for which there are at least two end populations that are too distantly related to interbreed.



3. For which evolutionary process do ring species provide evidence most directly?

   (A) Speciation

   (B) Natural selection

   (C) Sexual selection

   (D) Extinction

4. Which two populations in the diagram above represent the end populations?

   (A) Parental population and A4

   (B) Parental population and B3

   (C) A1 and B1

   (D) A4 and B3

**Questions 5 and 6 refer to the following chart.**

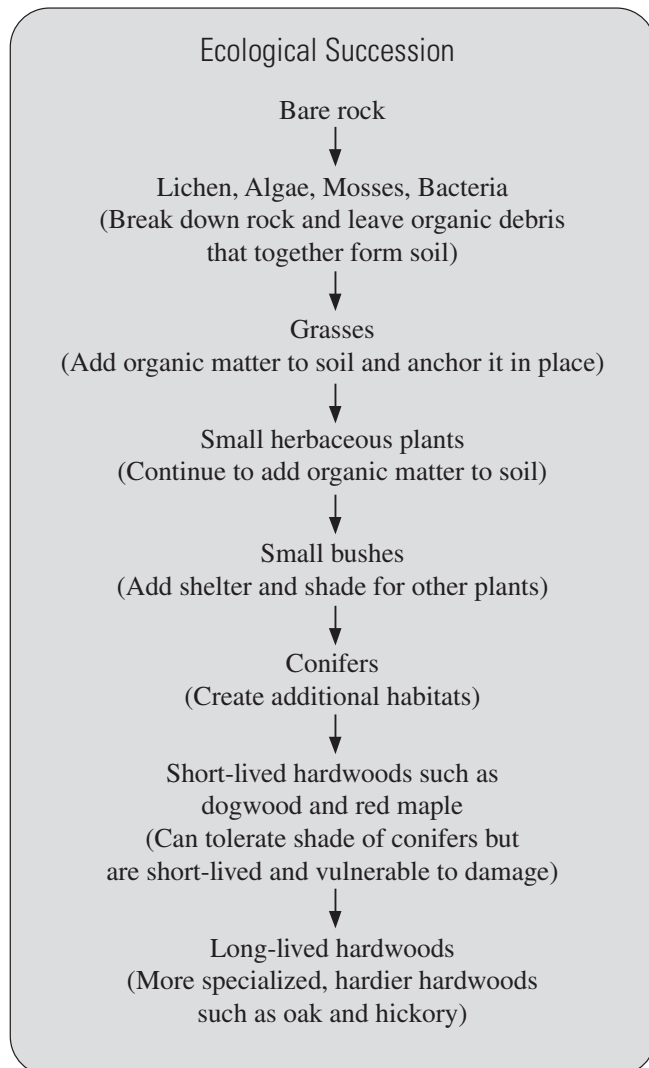Cumulative Number of Aquatic Invasive Species in the Great Lakes by Decade



5. Based on the chart, which category of invasive species in the Great Lakes showed the greatest increase from the 1950s to the 1960s?

    (A) Invertebrates

    (B) Plants

    (C) Protists

    (D) Bacteria/Viruses

6. Which of the following represents the approximate percentage increase in the total number of invasive species in the Great Lakes between the 1980s and the 2000s?

    (A) 13%

    (B) 20%

    (C) 30%

    (D) 80%

**GO ON TO THE NEXT PAGE.**

**Questions 7 and 8 refer to the following model.**

The model below shows an example of primary ecological succession resulting in a deciduous forest.

Ecological Succession

Bare rock
↓
Lichen, Algae, Mosses, Bacteria
(Break down rock and leave organic debris that together form soil)
↓
Grasses
(Add organic matter to soil and anchor it in place)
↓
Small herbaceous plants
(Continue to add organic matter to soil)
↓
Small bushes
(Add shelter and shade for other plants)
↓
Conifers
(Create additional habitats)
↓
Short-lived hardwoods such as dogwood and red maple
(Can tolerate shade of conifers but are short-lived and vulnerable to damage)
↓
Long-lived hardwoods
(More specialized, hardier hardwoods such as oak and hickory)

7. What type of event might result in a bare area where this type of ecological succession could occur?

    (A) Fire
    (B) Tornado
    (C) Clear-cutting
    (D) Glacial retreat

8. Which of the following animal species is likely to exist in this area during the second stage (Lichen, Algae, Mosses, Bacteria)?

    (A) mites, ants, spiders
    (B) nematodes, flying insects
    (C) lugs, snails, salamanders, frogs
    (D) squirrels, foxes, mice, moles, birds

**Questions 9 and 10 refer to the following information.**

Soil is a complex, ancient material teeming with living organisms. Soil development is an intricate dance that involves four basic processes and six soil-forming factors. It takes hundreds to thousands to millions of years for a soil to develop its characteristic layers or profile. Any soil you see is a dynamic formation produced by the effects of climate and biological activity (organisms), as modified by topography (relief) and human influences, acting on parent materials over time.

9. All of the following could be components of the influence of human activity on soil formation EXCEPT

    (A) Alteration of soil chemistry
    (B) Compaction
    (C) Decomposition
    (D) Salinization

10. Which of the following is true about soils used by humans?

    (A) Loamy soils composed of a balanced mixture of clay, silt, and sand are not ideal for plant growth.
    (B) Soil is considered a nonrenewable resource.
    (C) Monoculture practices in modern agriculture tend to enhance soil quality.
    (D) The structure of soil (the extent to which it aggregates or clumps) is unimportant with respect to its arability.

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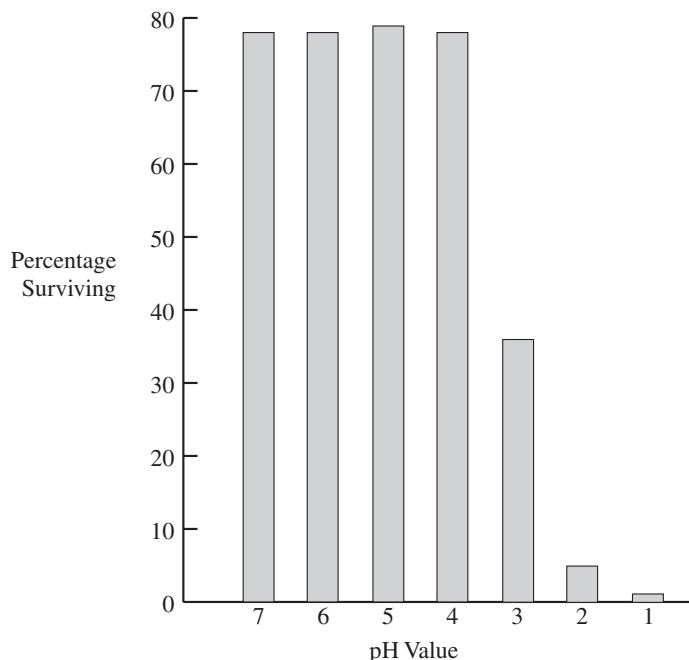**Questions 11–13 refer to the following information.**

One effect of global climate change is ocean acidification: the ongoing decrease in the pH of the oceans caused by the increase in atmospheric $CO_2$, which seawater takes up and dissolves. About 30–40% of the carbon dioxide that's released into the atmosphere due to human activities ends up in seawater and lakes and rivers. $CO_2$ reacts with water to form carbonic acid ($H_2CO_3$), and some of the carbonic acid molecules separate into bicarbonate ions ($HCO_3^-$) and hydrogen ions ($H^+$). The increase in hydrogen ions is interpreted as an increase in acidity. This increase can upset the balance of marine ecosystems by interfering with metabolism and immune response in some organisms, making it more difficult for organisms like coral and plankton to form calcium carbonate shells, and (along with ocean warming) contributing to coral bleaching and reef die-offs.

11. Which of the following is NOT a possible effect of ocean acidification that may impact human life and industry?

    (A) Coral bleaching

    (B) Disruption of marine food webs

    (C) Release of more $CO_2$ into the atmosphere

    (D) Putting endangered species more at risk due to habitat loss

12. Which is likely to be the best long-term solution to the problem of ocean acidification?

    (A) Reducing $CO_2$ emissions

    (B) Reducing overfishing and water pollution

    (C) Reforestation to add more oxygen to the atmosphere

    (D) Feeding iron to phytoplankton to speed up photosynthesis

13. The surface pH of the world's oceans has decreased since preindustrial times by about 0.11 pH units, which indicates an increase of almost 30% in the concentration of $H^+$ ions. If ocean surface pH is expected to drop by a further 0.3 to 0.5 pH units by 2100, approximately what range of possible increase does that represent in terms of $H^+$ ion concentration?

    (A) 82%–136%

    (B) 100%–216%

    (C) 173%–355%

    (D) 400%–600%

14. The goal of the second stage of a wastewater treatment plant is to

    (A) remove the large solid material

    (B) aerate the water

    (C) remove chemicals such as DDT or PCBs

    (D) lower the amount of organic material in the water

15. Which of the following organisms are the first to be adversely affected by thermal pollution in a stream?

    (A) Trees along the bank

    (B) Insect larvae in the water

    (C) Large fish migrating upstream

    (D) Bacteria in the water

**GO ON TO THE NEXT PAGE.**

**Questions 16–19 refer to the following information and graph.**

A scientist placed 100 fish eggs into each of seven solutions with different pH values. After 96 hours, the number of survivors was counted and converted into a percentage. The survival percentages are given in the graph below.



16. Which of the values below best represents the $LD_{50}$ in this experiment?

    (A) 4.0

    (B) 4.5

    (C) 3.0

    (D) 2.5

17. Which of the following, if added to the solutions, would lead to an increase in pH?

    (A) Limestone

    (B) Carbon dioxide

    (C) Nitrogen dioxide

    (D) Sulfur dioxide

18. Which of the following best describes the goal of the experiment?

    (A) To observe how many fish would hatch at different pH values

    (B) To find out how many fish live in streams with different pH values

    (C) To understand how acid rain affects life in streams

    (D) To see what chemical is best at changing the pH of water

19. The pH value is a measure of the

    (A) amount of heavy metals in the water

    (B) biochemical oxygen demand (BOD) of the water

    (C) concentration of oxygen in the water

    (D) concentration of hydrogen ions in the water

20. Which of the following laws created the Superfund program?

    (A) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

    (B) Resource Conservation and Recovery Act

    (C) Clean Air Act

    (D) National Environmental Policy Act

21. Late fall frosts and the northward migration of some tree and plant species may indicate which of the following global changes?

    (A) Increased global temperatures

    (B) The effects of more ultraviolet light from the sun

    (C) A reduction in the volume of ice at the North and South Poles

    (D) Changes in global precipitation patterns

22. High infant mortality rates are likely to exist in countries that have

    (A) a strong and stable economy

    (B) high levels of education for adults

    (C) a stable food supply

    (D) high levels of infectious diseases

**GO ON TO THE NEXT PAGE.**

23. All of the following statements are true EXCEPT

    (A) energy can be converted from one form to another

    (B) energy input always equals energy output

    (C) energy and matter can generally be converted into each other

    (D) at each step of an energy transformation, some energy is lost to heat

24. Oxygen-depleted zones of the oceans, such as the one at the mouth of the Mississippi River, are most likely caused by

    (A) a reduction in the plant life in rivers that empty into the ocean near the dead zone

    (B) excessive fertilizers carried into the ocean, which cause algal blooms that lower the oxygen levels

    (C) thermal pollution in the ocean

    (D) acid precipitation falling onto the ocean

25. One potential benefit of using genetically modified foods is

    (A) the release of genes to other plants or animals

    (B) the resistance of crops against pesticides

    (C) their growth in monoculture leads to a reduction in biodiversity in the area

    (D) unknown effects on the ecosystem into which they are released

26. Which of the following compounds would probably supply the greatest amount of useful energy to humans?

    (A) The exhaust from a car

    (B) Unrefined aluminum ore

    (C) A glass bottle

    (D) A liter of gasoline

27. Which of the following choices gives the geologic eras in the correct sequence, from the oldest to the most recent?

    (A) Cenozoic—Mesozoic—Paleozoic—Precambrian

    (B) Precambrian—Paleozoic—Mesozoic—Cenozoic

    (C) Paleozoic—Precambrian—Cenozoic—Mesozoic

    (D) Paleozoic—Cenozoic—Precambrian—Mesozoic

28. Approximately what percentage of the world's solid waste does the United States produce?

    (A) 50 percent

    (B) 33 percent

    (C) 10 percent

    (D) 5 percent

29. Which of the following correctly describes conservation easement?

    (A) A process that conserves soil from erosion

    (B) A binding agreement that preserves land from further development in exchange for tax write-offs

    (C) An agreement that allows a developer to add new land to a housing project with little input from neighbors

    (D) A practice that prevents the breakdown of stream banks

30. The highest priority of the Clean Water Act is to provide

    (A) guidance in toxic chemical disposal

    (B) funds to reclaim old strip mines

    (C) policies to lessen the number of oil spills in the ocean

    (D) policies to attain fishable and swimmable waters in the United States

31. Which of the following best describes changes in the genetic composition of a population over many generations?

    (A) Evolution

    (B) Mutation

    (C) Natural selection

    (D) Biomagnification

32. Women have fewer and healthier children when all of the following are true EXCEPT

    (A) they have little education

    (B) they live where their rights are not suppressed

    (C) they have access to medicine and health care

    (D) the cost of a child's education is high

**GO ON TO THE NEXT PAGE.**

33. Which of the following is a true statement?

    (A) The population size of organisms following a logical population growth is not limited by a carrying capacity.

    (B) The population size of organisms following an exponential growth is limited by a carrying capacity.

    (C) Increasing the death rate of a population can lower the carrying capacity.

    (D) Increasing the rate of food production can increase the carrying capacity.

34. An increase in the amount of UV light striking the Earth as a result of ozone loss will cause which of the following?

    (A) Global climate change

    (B) Increased skin cancer rates in humans

    (C) Lowering of ocean water levels

    (D) An increase in $CO_2$ in the atmosphere

35. Ozone in the troposphere can result in all of the following EXCEPT

    (A) eye irritation

    (B) lung cancer

    (C) bronchitis

    (D) headache

36. Which of the following describes the amount of energy that plants pass on to herbivores?

    (A) The amount of solar energy in a biome

    (B) The First Law of Thermodynamics

    (C) The Net Primary Productivity (NPP) of an area

    (D) The Second Law of Thermodynamics

37. The Second Law of Thermodynamics relates to living organisms because it explains why

    (A) matter is never destroyed but it can change shape

    (B) plants need sunlight in order to survive

    (C) all living things must have a constant supply of energy in the form of food

    (D) the amount of energy flowing into an ecosystem is the same as the amount flowing out of that system

38. Acid deposition most severely affects amphibian species because amphibians

    (A) do not care for their young

    (B) are not mammals

    (C) need to live in both terrestrial and aquatic habitats

    (D) seldom reproduce

39. All of the following are internal costs of an automobile EXCEPT

    (A) car insurance

    (B) fuel

    (C) pollution and health care costs

    (D) raw materials and labor

40. Scrubbers are devices installed in smokestacks to

    (A) reduce the amount of materials such as $SO_2$ in the smoke they discharge

    (B) clean out the stack so smoke can move rapidly upward

    (C) reduce the amount of sulfur in coal before it is burned

    (D) reduce the amount of toxic ash produced

41. After ore is mined, the unusable part that remains is placed in piles called

    (A) overburden

    (B) seam waste

    (C) leachate

    (D) tailings

42. All of the following are examples of externalities EXCEPT

    (A) a construction worker purchasing an automobile that reduces his commute time to work.

    (B) a factory producing air pollution that leads to acid rain in the neighboring forest area.

    (C) the construction of a new football stadium leading to increased income for local businesses.

    (D) driving electric and hybrid vehicles reducing the amount of greenhouse gas emissions.

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43. Which fuel contains the greatest amount of sulfur?

    (A) Wood

    (B) Natural gas

    (C) Nuclear reactor fuel rods

    (D) Coal

44. Biological reserves are areas that allow countries to

    (A) concentrate agricultural production in one area

    (B) set aside critical habitats to ensure the survival of species

    (C) control the flow of rivers and storm waters

    (D) provide grazing land in order to ensure economic growth

45. Which of the following countries has the shortest population doubling time?

    (A) Denmark

    (B) Australia

    (C) United States

    (D) Kenya

46. Which of the following processes leads to an increase in atmospheric water content?

    (A) Precipitation

    (B) Transpiration

    (C) Infiltration

    (D) Condensation

47. Full cost pricing of a refrigerator would include

    (A) adding the cost of employee salaries to the total cost

    (B) the refrigerator's total impact on the environment

    (C) the cost of transporting the refrigerator to the retail store

    (D) the value of the refrigerator if it was donated to a nonprofit group

48. Since 2000, the atmospheric concentration of which of the following has decreased as a result of anthropogenic activity?

    (A) Methane

    (B) Carbon dioxide

    (C) Chlorofluorocarbons

    (D) Nitrous oxide

49. During a society's postindustrial state, the population will exhibit

    (A) rapid growth with a low birth rate and high death rate

    (B) slow growth with a slowing birth rate and a low death rate

    (C) rapid growth with a high birth rate and low death rate

    (D) zero growth with a low birth rate and low death rate

50. Which of the following is NOT a disadvantage of old-style landfills?

    (A) They generate gases that can be recovered and used as fuel.

    (B) Bad odors come from these landfills.

    (C) Toxic wastes leach into ground water.

    (D) Subsidence of the land after the landfill is filled.

51. The international treaty concerning endangered species (CITES) has tried to protect endangered species by taking which of the following steps?

    (A) Making more countries keep these species in zoos

    (B) Paying the debts of member countries in order to relieve the pressure to sell endangered species

    (C) Developing a list of endangered species and prohibiting trade in those species

    (D) Restoring endangered habitats

52. In 2000, the population of Country A was 50,000. If Country A has a constant birth rate of 33 per 1,000 and a constant death rate of 13 per 1,000, when will the population of Country A equal 200,000?

    (A) 2035

    (B) 2050

    (C) 2070

    (D) 2105

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53. Salt intrusion into freshwater aquifers, beach erosion, and the disruption of costal fisheries are all possible results of which of the following?

    (A) Rising ocean levels as a result of global warming

    (B) More solar ultraviolet radiation on the Earth

    (C) More chlorofluorocarbons in the atmosphere

    (D) Reduced rates of photosynthesis

54. The chemical actions that produce compost would best be described as

    (A) photosynthesis

    (B) augmentation

    (C) respiration

    (D) decomposition

55. Which of the sources below would produce non-point source pollution?

    (A) The smokestack of a factory

    (B) A volcano

    (C) A pipe leading into a river from a sewage treatment plant

    (D) A large area of farmland near a river

56. A nation's gross domestic product represents

    (A) the ability to provide health care

    (B) the amount of goods it imports

    (C) the amount of its economic output

    (D) the quality of its environment

57. Which of the following mining operations requires people and machinery to operate underground?

    (A) Mountain top removal

    (B) Contour stripping

    (C) Dredging

    (D) Shaft sinking

58. A country's total fertility rate (TFR) indicates which of the following?

    (A) The life expectancy of women in the country

    (B) The average number of babies born to women between the ages of 14 and 45

    (C) The number of babies under one year of age who die per 1,000

    (D) The total use of contraceptives in the country

59. The wastes stored in Love Canal contaminated the surrounding area by all of the following methods EXCEPT

    (A) leaching into the ground water

    (B) fumes from burning the wastes

    (C) runoff into a nearby stream

    (D) spilled drums of waste

60. All of the following are currently used by humans to produce energy EXCEPT

    (A) nuclear fusion

    (B) nuclear fission

    (C) harnessing solar energy

    (D) harnessing the Earth's internal heat

61. In sea water, carbon is mostly found in the form of

    (A) phosphoric acid

    (B) carbon disulfide

    (C) bicarbonate ions

    (D) methane gas

62. Acid rain and snow harm some areas more than others because certain areas

    (A) have more bacteria in the soil than others

    (B) have a lesser ability to neutralize the acids

    (C) are at a higher elevation than the unaffected areas

    (D) are closer to lakes than are the unaffected areas

63. Which one of the following does NOT store a great deal of phosphorus?

    (A) Rocks

    (B) Water

    (C) Atmosphere

    (D) Living organisms

64. The addition of oxygen to the early Earth's atmosphere most likely occurred through the process of

    (A) volcanic outgassing

    (B) photosynthesis

    (C) meteorite impact

    (D) respiration by animals

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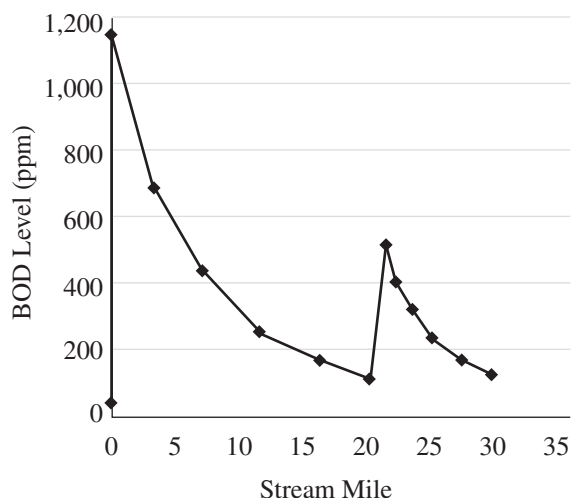
65. Scientists use which of the following to estimate environmental risks to humans?

     I.   Animal studies
     II.  Epidemiological studies
     III. Statistical probabilities

(A) II only

(B) I and II only

(C) I and III only

(D) I, II, and III

**Questions 66–69 refer to the following graph.**

A group of students did a Biological Oxygen Demand (BOD) study along a 30-mile section of a stream. The data they obtained are given in the graph below.



66. Which of the following best describes the type of pollution at mile 0?

(A) Point source

(B) Acid deposition

(C) Secondary pollutant

(D) Deep well

67. The BOD at mile 12 is approximately

(A) 700 ppm

(B) 220 ppm

(C) 200 ppm

(D) 175 ppm

68. The BOD test is designed to directly measure

(A) how much light can pass to the bottom of the stream

(B) the amount of nitrates in the water

(C) the amounts of coliform bacteria

(D) the rate at which oxygen is being consumed by microorganisms

69. Anaerobic bacteria, sludge worms, and fungi are most likely to be found in which part of this stream?

(A) 0 to 5 miles

(B) 10 to 15 miles

(C) 15 to 20 miles

(D) 25 to 30 miles

70. Riparian zones are important parts of lands because they are

(A) the area where most cattle feed when they graze

(B) an area of diverse habitats along the banks of rivers

(C) important buffers against wind

(D) areas where varying amounts of light cause different layers of plant growth

71. Which of the following is a disadvantage of fish farming?

(A) It can allow for genetic engineering, which leads to bigger yields.

(B) It is very profitable.

(C) It can lead to large die-offs due to disease.

(D) It can reduce the pressure to harvest wild species.

72. The form of nitrogen that plants can use directly is

(A) nitrates

(B) nitrites

(C) $N_2$ gas

(D) methane

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73. Which of the following best describes the effects of a thermal inversion?

    (A) Cold ocean water moves to the surface and warm water sinks.

    (B) Warm, polluted air rises and mixes with cool upper air, and pollutants escape.

    (C) Warm river water cools when it enters the ocean.

    (D) Polluted air at the surface cannot rise because it is blocked by warm air above it.

74. Shifting taxes to tax pollution and waste rather than taxing the cost of products will allow people to

    (A) maximize profit

    (B) increase the tax base in a city

    (C) use tax money for local schools

    (D) shift to a pattern of more sustainable development

75. Which of the following molecules is most damaging to stratospheric ozone?

    (A) $H_2O$

    (B) $CO_2$

    (C) Chlorofluorocarbons

    (D) $N_2O$

76. Which of the following ocean zones has the highest levels of nutrients?

    (A) Coastal zone

    (B) Euphotic zone

    (C) Bathyal zone

    (D) Abyssal zone

77. Samples of atmospheric gases from past eras can most easily be obtained from which of the following sources?

    (A) Methane gas trapped in oil reserves

    (B) Different types of sedimentary rock

    (C) Gases trapped in polar ice caps

    (D) Mud samples from eutrophic lakes

78. Acid deposition on soil kills beneficial decomposers. Which of the following cycles would be most affected by the loss of decomposers?

    (A) Sulfur cycling

    (B) Phosphorus cycling

    (C) Hydrologic cycling

    (D) Nitrogen cycling

79. Which of the following is a trace element necessary for plant growth?

    (A) Carbon

    (B) Nitrogen

    (C) Phosphorous

    (D) Magnesium

80. Concerns that people of color and poor people are disproportionately exposed to environmental pollution are most likely to be addressed by people who believe in the

    (A) Earth stewardship view

    (B) planetary manager view

    (C) environmental justice movement

    (D) sustainability point of view

# END OF SECTION I

**ENVIRONMENTAL SCIENCE
SECTION II
Time—70 minutes
3 Questions**

**Directions:** Answer all three questions, which are weighted equally; the suggested time is about 23 minutes for answering each question. Where calculations are required, clearly show how you arrived at your answer. Where explanation or discussion is required, support your answers with relevant information and/or specific examples.

1. The following editorial is excerpted from a recent edition of the Hilltop Express:

### Hilltop Express

# New Pests Invade Farm

A new species of corn-infesting insect has recently been discovered in a local farmer's field. Bill Jones stated: "Last week a section of my corn field was covered in small black beetles. They can fly from plant to plant, and they eat large holes in the leaves. I called the county extension agent Sarah Smith and she came out and identified them. I'm going to start spraying tomorrow morning." In a telephone interview with Sarah, she stated that this species was new to the county and has the potential for causing real damage to the corn crop. She stated that the adults do most of the damage to growing leaves.

The grubs live near the base of the plant and feed on bacteria and other organisms living in the soil. She added that the beetle was resistant to the most common pesticide, NOGrub. NOGrub, she commented, had been tried in another county and was not found to be effective. The editors of the Hilltop Express realize the potential dangers to the county's most important cash crop. We urge the county agents to recommend a series of new pesticide treatments to control this new menace to our livelihood.

(a) **Explain** how the beetle might have become resistant to NOGrub. Assume that NOGrub had been applied to a population of beetles in another county.

(b) If the county agents do not have information on which pesticide is most effective against the beetle, the county plans to investigate by trying several pesticides on controlled sections of beetle-infested crop.
   i. **Identify** the independent and dependent variables in such a trial.
   ii. **Describe** an effective control group and the experimental groups for this experiment.
   iii. **Identify** TWO environmental factors that must be controlled to keep the experiment from producing skewed results.

(c) **Identify** TWO negative impacts of using chemical pesticides on the surrounding ecosystem.

(d) One strategy for combating pests is Integrated Pest Management (IPM).
   i. **Describe** IPM.
   ii. **Identify** one benefit and one difficulty the county would likely encounter in using IPM to control this outbreak.

**GO ON TO THE NEXT PAGE.**

2. The map below shows two cities: City *X* and City *Z*, separated by several kilometers.

City *X*                                  City *Z*

●                                              ●

☐         ☐         ☐

Site B    Site C    Site D

☐

☐                                              Site E

Site A

Students from a high school in between the two cities studied soil pH values at the sites labeled A through E on the map. The results of the pH study are given in the following table:

| Site | pH value |
|------|----------|
| A | 6.2 |
| B | 5.6 |
| C | 5.0 |
| D | 4.5 |
| E | 4.3 |

(a) Refer to the table and diagram above to answer the following questions.
   i.   **Describe** one point source for the pollution that caused the change in the soil's pH as shown.
   ii.  In the description, **identify** a fuel that could create the pollution.

(b) Assume that the fuel identified in (a)(i) is the source of the pollution.
   i.   **Identify** one primary and one secondary pollutant that can cause the change in the soil's pH.
   ii.  **Describe** the process that causes the change in the pH.

(c) **Propose** one possible method to reduce the air pollutants that are causing the pH change.

(d) **Identify** and **describe** one provision of the Clean Air Act of 1990 that could be used to control and reduce the emissions.

**GO ON TO THE NEXT PAGE.**

3. According to the United States Energy Information Administration, the consumption of natural gas by the United States increases at 8 percent per year. The U.S. receives its supplies from a variety of international and domestic locations. Natural gas is used in the home, for industry, and for power generation.

    (a) **Calculate** the approximate number of years it would take to double the consumption of natural gas in the United States. **Show** all your work.

    (b) **Identify** one method by which natural gas is recovered and transported.

    (c) **Describe** two benefits to the environment that would occur if the United States switched from coal to natural gas-fired electric power generation.

    (d) Some people advocate increasing the use of coal versus natural gas for the production of electricity. Give one argument that the proponents of coal might use to **justify** their position.

    (e) Others advocate for non-hydrocarbon fuel alternatives.
        i. **Identify** one non-hydrocarbon fuel alternative.
        ii. **Describe** ONE drawback of the alternative identified in (e)(i).

# STOP

# END OF EXAM
———————

**GO ON TO THE NEXT PAGE.**

**Completely darken bubbles with a No. 2 pencil. If you make a mistake, be sure to erase mark completely. Erase all stray marks.**

**1. YOUR NAME:** _____
(Print)  Last    First    M.I.

**SIGNATURE:** _____  **DATE:** ___ / ___ / ___

**HOME ADDRESS:** _____
(Print)  Number and Street

_____
City    State    Zip Code

**PHONE NO. :** _____
(Print)

**IMPORTANT: Please fill in these boxes exactly as shown on the back cover of your test book.**

## 2. TEST FORM

## 3. TEST CODE

## 4. REGISTRATION NUMBER

## 5. YOUR NAME
First 4 letters of last name | FIRST INIT | MID INIT

## 6. DATE OF BIRTH

| Month | Day | Year |
|-------|-----|------|
| JAN | | |
| FEB | | |
| MAR | 0 0 | 0 0 |
| APR | 1 1 | 1 1 |
| MAY | 2 2 | 2 2 |
| JUN | 3 3 | 3 3 |
| JUL | | 4 4 |
| AUG | | 5 5 |
| SEP | | 6 6 |
| OCT | | 7 7 |
| NOV | | 8 8 |
| DEC | | 9 9 |

## 7. SEX
MALE
FEMALE

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# Section I

Start with number 1 for each new section.
If a section has fewer questions than answer spaces, leave the extra answer spaces blank.

1–80. (A) (B) (C) (D)