

AP Environmental Science

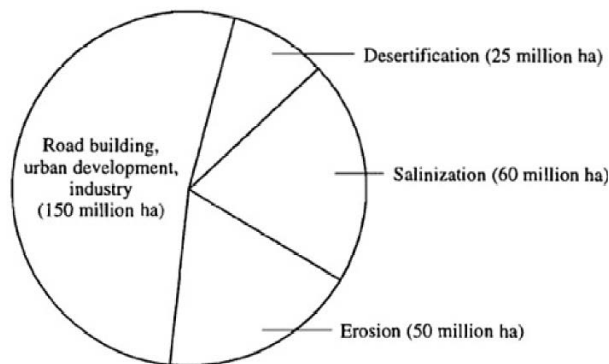
Assessment 2

MULTIPLE CHOICE QUESTIONS

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the one that is best in each case and enter the appropriate letter in the corresponding space on the answer sheet.

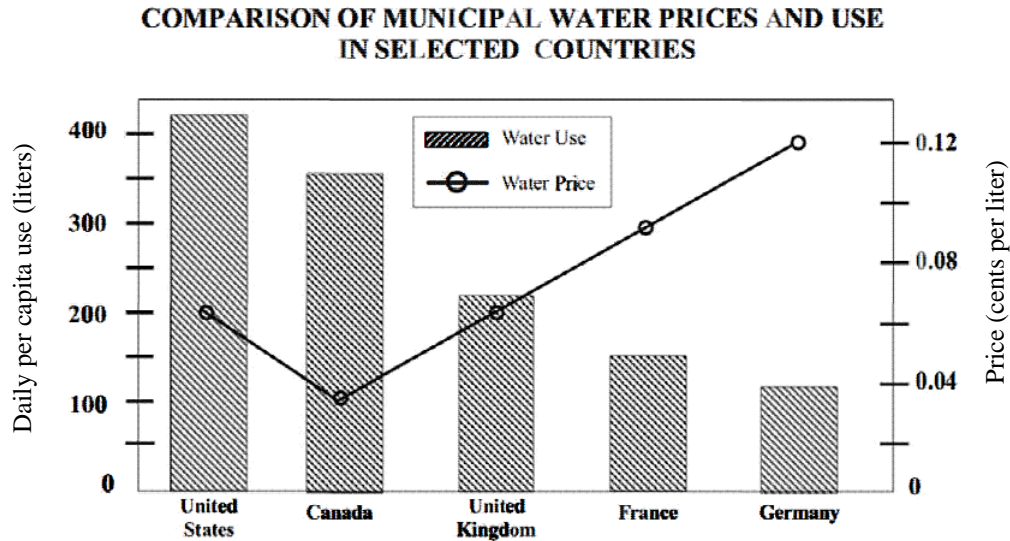
- In 2015, the United States had approximately 480 cars for every 1,000 people. The population of the United States in 2015 was approximately 320 million people. The total number of cars in the United States in 2015 was closest to
 - 150,000
 - 30,000,000
 - 160,000,000
 - 300,000,000
 - 3,000,000,000

ESTIMATED WORLD ARABLE LAND LOST
BETWEEN 1985 AND 2000



- According to the information in the graph above, which of the following contributed to the LEAST amount of arable land lost?
 - Technological advances in road construction
 - Urban development
 - Desertification
 - Salinization
 - Erosion

3. The process of extracting and separating gold in remote regions often results in environmental contamination with which of the following?
- (A) Ozone
 - (B) Cyanide
 - (C) CFCs
 - (D) Asbestos
 - (E) Selenium
4. Which of the following is true of farm-raised salmon?
- (A) They are more genetically diverse than their wild counterparts.
 - (B) They seldom escape from their containment areas.
 - (C) They have no impact on the quality of the water in which they are raised.
 - (D) They are often infected with parasites and sea lice.
 - (E) They are maintained at lower population densities than are wild salmon.
5. Which of the following is the best illustration of the pesticide treadmill?
- (A) Sequence of several pesticides used by farmers to maximize effectiveness
 - (B) Increased use of pesticides to eradicate genetically resistant pests
 - (C) Biomagnification of pesticides in the fatty tissue of primary consumers
 - (D) Movement of pesticides following their percolation into the groundwater
 - (E) Process that is used to manufacture pesticide



6. The chart above compares the daily water use per person to the price of water in selected countries. Which of the following conclusions can be correctly drawn using only the data in the chart?
- (A) Larger countries tend to use less water
 - (B) Water is most plentiful in the United States
 - (C) Decreased prices cause water use to decline
 - (D) The price of water in developed countries does not vary
 - (E) Germany has the highest water prices and based on per capita uses the least amount
7. A field is abandoned, and an invasive plant that can live in nutrient-poor soil moves into the field. If the land is later cleared of this invasive species and it is discovered that the soil has an abundance of nitrogen compounds, what conclusion can best be made?
- (A) The plants used up all of the phosphorus and potassium and left the nitrogen behind.
 - (B) Primary succession always produces an abundance of nitrogen.
 - (C) Bacteria in soil and in root nodules converted free nitrogen into nitrogen compounds.
 - (D) The plants were able to produce nitrogen in their leaves.
 - (E) More rock was weathered and broken down to release nitrogen compounds.

8. If an area was originally forested and then underwent urban development, which of the following shows the most likely effects on various parts of the water cycle in the area?

(Note: ↑ represents an increase; ↓ represents a decrease)

	Evaporation and Transpiration	Runoff	Groundwater Recharge
(A)	↓	↑	↓
(B)	↓	↑	↑
(C)	↓	↓	↓
(D)	↑	↑	↓
(E)	↑	↓	↓

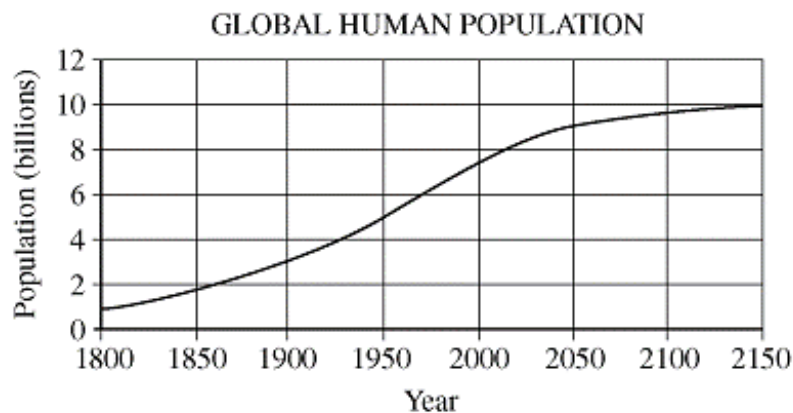
9. Which of the following practices is consistent with the production of organic crops according to the United States Department of Agriculture?

- (A) Using sodium nitrate as a fertilizer on green, leafy vegetables
- (B) Using strychnine to prevent buildup of aphid populations in field crops
- (C) Using chemicals known as pheromones to disrupt insect mating cycles
- (D) Using sewage sludge to improve the fertility and structure of soil
- (E) Using genetically modified plant varieties that kill insects that chew their leaves

10. Which of the following best describes the process known as “mountaintop removal”?

- (A) The use of trees at high elevations to eliminate carbon dioxide from the atmosphere
- (B) The use of heavy equipment to move overburden downhill during the strip mining of coal
- (C) The placement of hazardous-waste disposal sites at high elevations in mountainous regions
- (D) The shearing away of undersea mountain peaks to improve shipping lanes
- (E) The reduction of glacial ice resulting from increased global temperatures

11. Vegetarianism is often cited as a partial solution to the growing problem of deforestation and other types of habitat destruction as the human population continues to grow. The reason for this is
- (A) vegetarians are healthier due to a lack of animal fat in their diets.
 - (B) more people can be fed using less agricultural land because vegetarians eat at a lower trophic level.
 - (C) vegetarians consume fewer calories per person and therefore require fewer acres of farmland.
 - (D) vegetarian diets often recommend consuming large amounts of tree nuts as a source of protein, which preserves forest habitats.
 - (E) vegetarians often support conservation efforts that promote forest conservation.
12. Which of the following describes a fundamental characteristic of the green revolution in food resources?
- (A) The application of higher levels of organic fertilizers to increase rice production
 - (B) Deforestation to provide field crops with increased sunlight for photosynthesis
 - (C) The addition of calorie, fat and fiber percentages to the information provided on food package labels
 - (D) The development of new strains of crops with higher yields
 - (E) The discovery that chlorophyll adds nutritional value to wheat, rice and sorghum

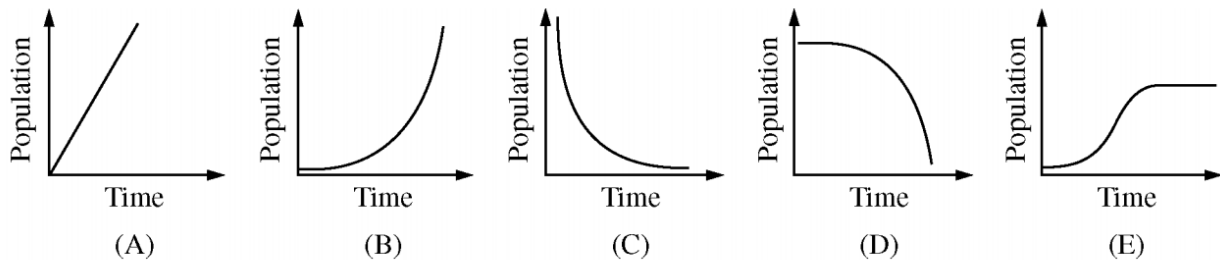


13. According to the graph above, the global human population will most likely
- (A) reach a maximum value that is less than 8 billion.
 - (B) reach a maximum rate of growth in 2150.
 - (C) have doubled between 1950 and 2150.
 - (D) be growing exponentially in 2100.
 - (E) be declining after 2150.
14. Which of the following is likely to minimize soil erosion?
- (A) High-yield crops
 - (B) Deforestation
 - (C) Herbicide use
 - (D) Annual plowing
 - (E) No-till agriculture
15. Which of the following best describes the process of leaching?
- (A) Water percolating through soil, dissolving some of its material
 - (B) The falling of acid precipitation from the atmosphere to Earth's surface
 - (C) The use of chemicals to reduce the amount of *E. coli* in wastewater
 - (D) Rocks embedded in a glacier being carried downslope
 - (E) The use of irrigation on a crop of wheat

16. Which of the following methods of agricultural irrigation results in the loss of the least amount of water by evaporation?

- (A) Conventional center-pivot irrigation
- (B) Drip irrigation
- (C) Laser-level irrigation
- (D) Flood irrigation
- (E) Gravity-flow irrigation

QUESTIONS 17 AND 18 REFER TO THE FIVE GRAPHS SHOWN BELOW, WHICH ILLUSTRATED DIFFERENT RELATIONSHIPS BETWEEN POPULATION AND TIME.



17. Which graph best illustrates a population growing at its biotic potential?

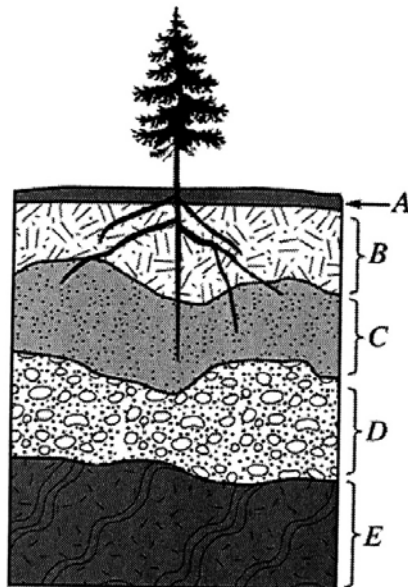
18. Which graph best illustrates a population that was growing and has reached its carrying capacity?

19. Which of the following is the best explanation of the fact that agricultural production on floodplains is often relatively high?

- (A) On the floodplains, soils tend to be nutrient-rich and fertile.
- (B) On floodplains, high water tables make irrigation unnecessary.
- (C) Periodic flooding leaches toxic pollutants out of floodplain soils.
- (D) Periodic flooding prevents the pH of floodplain soils from becoming too high.
- (E) Floodplains are usually sparsely settled and thus more acreage is available for agriculture.

20. Of the following, which is the best example of reclamation of disturbed lands?

- (A) Restoring vegetation to an area that has been mined
- (B) Constructing a new wetland to compensate for the loss of wetlands
- (C) Growing crops on land formerly used for grazing
- (D) Reintroducing an endangered species into an area from which it has disappeared
- (E) Regulating the use of a natural resource in order for it to renew itself

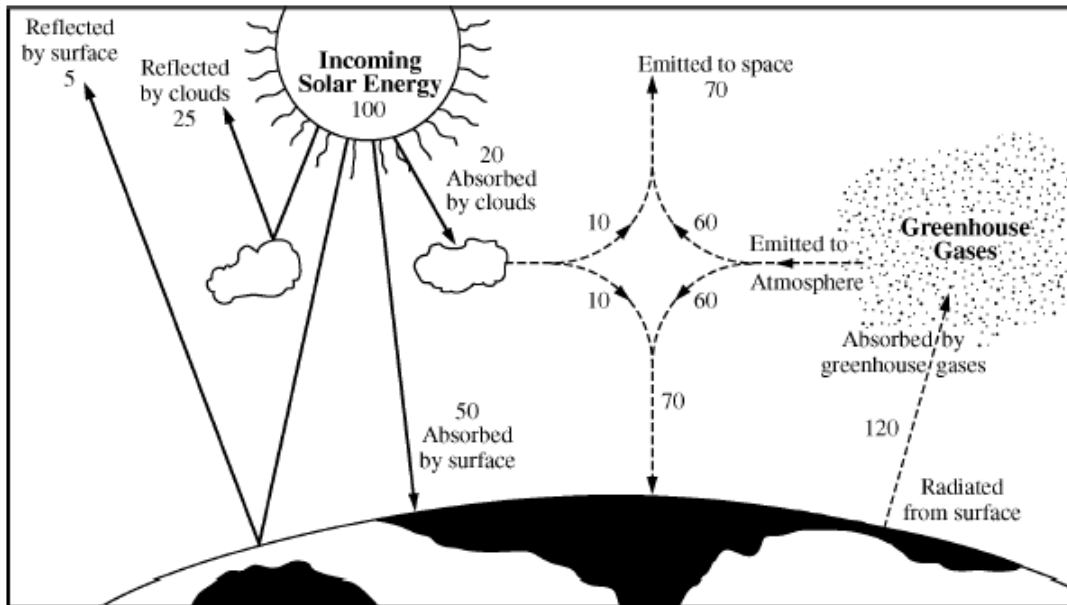


21. Which of the lettered choices in the soil profile above represents the region with the greatest concentration of organic material?

22. The National Environmental Policy Act (NEPA) of 1969 required all agencies responsible for a major federal project that could significantly affect the quality of the environment to file which of the following?

- (A) A mitigated negative declaration
- (B) A geographic information system report
- (C) An environmental impact statement
- (D) An agency review
- (E) A cost-benefit analysis

QUESTIONS 23 – 25 REFER TO THE DIAGRAM BELOW, WHICH ILLUSTRATES EARTH’S ATMOSPHERIC GREENHOUSE EFFECT.



23. How many units of energy do greenhouse gases contribute to the greenhouse effect?

- (A) 20
- (B) 50
- (C) 60
- (D) 100
- (E) 120

24. How many units of energy are absorbed by Earth’s surface?

- (A) 45
- (B) 50
- (C) 60
- (D) 70
- (E) 120

25. How many units of energy return to space from Earth and its atmosphere?
- (A) 25
 - (B) 30
 - (C) 95
 - (D) 100
 - (E) 120
26. Road construction, logging, and mining are banned in which of the following federal lands?
- (A) National parks
 - (B) National wildlife refuges
 - (C) National forests
 - (D) National wilderness preservation areas
 - (E) National resource lands
27. Which of the following does *not* explain the rise of the modern farming system?
- (A) The cost of labor varies from country to country.
 - (B) Small farms are usually more profitable than large farms.
 - (C) Irrigation contributes to greater crop yields.
 - (D) Fertilizers improve crop yields and are easy to apply.
 - (E) Mechanization facilitates monocropping and improves profits.

28. Irrigation can result in which of the following environmental problems?

- I. Reduction of evaporation rates
- II. Accumulation of salts in soil
- III. Waterlogging of soil and plant roots

- (A) I only
- (B) II only
- (C) III only
- (D) I and II
- (E) II and III

29. Which of the following practices is *not* a part of integrated pest management?

- (A) Crop rotation
- (B) Elimination of pesticides
- (C) Use of pest-resistant crops
- (D) Introduction of predators
- (E) Frequent inspection of crops

30. Concentrated animal feeding operations (CAFOs) can best be described as

- (A) facilities where a large number of animals are housed and fed in a confined space.
- (B) a method of producing more meat at a higher cost.
- (C) a means of producing great quantities of manure to fertilize fields organically.
- (D) an experimental plan to test the effectiveness of antibiotics.
- (E) storing and compacting of grain for use as a nutrient supplement for cattle.

31. Which of the following was a significant cause of urban sprawl over the past 50 years?
- (A) Migration of people from rural areas to large central cities
 - (B) Increased availability of public transportation
 - (C) Lower property taxes in urban areas
 - (D) Use of the federal gasoline tax to construct and maintain highways
 - (E) Improved infrastructure and reduced crime rates in urban areas
32. Which of the following is *not* an environmental benefit of smart growth?
- (A) Reduced flooding
 - (B) Increased impervious surfaces
 - (C) Reduced fossil fuel consumption
 - (D) Increased open space
 - (E) Decreased water pollution
33. For many years, forest fires were suppressed to protect lives and property. This policy has led to
- (A) a buildup of biomass that can fuel larger fires.
 - (B) many forest species being able to live without having their habitats destroyed.
 - (C) increased solar radiation in most ecosystems.
 - (D) soil erosion on steep slopes.
 - (E) economic instability.

34. Which of the following best represents the percent of water that is used for various purposes worldwide?

	Agriculture	Industrial and Municipal	Residential and Commercial
(A)	10%	20%	70%
(B)	20%	30%	50%
(C)	30%	50%	20%
(D)	50%	10%	40%
(E)	70%	20%	10%

35. Which of the following is *not* an environmental consequence of clear-cutting?

- (A) Increased soil erosion and sedimentation in nearby streams
- (B) Decreased biodiversity due to habitat fragmentation
- (C) Increased fish populations due to the influx of nutrients into streams
- (D) Decreased tree species diversity due to the loss of shade-tolerant species
- (E) Stands of same-aged trees

36. Approximately what percentage of the Earth's water is fresh water?

- (A) 3 percent
- (B) 10 percent
- (C) 50 percent
- (D) 90 percent
- (E) 97 percent

37. Which of the following statements about desalination is correct?

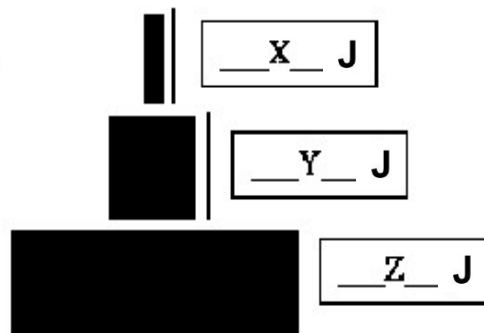
- (A) Distillation typically requires more energy than reverse osmosis.
- (B) The brine left over from desalination is not harmful when returned to the ocean.
- (C) Large-scale desalination of water is affordable to all nations.
- (D) Desalination of ocean water is not yet a feasible endeavor.
- (E) Most desalination occurs along the coast of South America.

38. Select the correct order of particle size of sediment particles from largest to smallest.

- (A) sand-silt-clay
- (B) silt-sand-clay
- (C) loam-silt-clay
- (D) loam-sand-silt
- (E) clay-silt-sand

39. Looking at the ecological pyramid, what would be the most likely number of joules to fill in X, Y and Z?

- (A) X=100; Y=1000; Z=10,000
- (B) X=1; Y=500; Z=10,000
- (C) X=10,000; Y=500; Z=1
- (D) X=50; Y=50,000; Z=500,000
- (E) X=10,000; Y=1000; Z=10



40. Choose the correct sequence for energy flow within an ecosystem

- (A) herbivores → producers → carnivores → scavengers
- (B) producers → herbivores → carnivores → scavengers
- (C) producers → carnivores → herbivores → scavengers
- (D) scavengers → producers → herbivores → carnivores
- (E) carnivores → scavengers → producers → herbivores

41. In what ways have humans influenced the nitrogen cycle?

- I. Desalinization
- II. Use of fertilizers
- III. Combustion of fossil fuels

- (A) I only
- (B) II only
- (C) III only
- (D) II and III
- (E) I, II and III

42. A laboratory experiment followed the growth of a flour beetle (*Tribolium sp.*) population over time. At first the population increased dramatically but later growth slowed and the population size leveled off. While food (the wheat flour in which they live) was abundant, it was noticed that flour beetles resorted to eating their own eggs when densities got high. What can we conclude about cannibalism in this species?

- (A) It serves as a density-dependent means of population control.
- (B) We cannot reach any conclusion based on the information provided.
- (C) It serves as a density-independent means of population control.
- (D) It has no effect on the growth of the population, as food scarcity is clearly the limiting factor here.
- (E) It is clearly maladaptive as populations always do best when their densities rise as high as possible.

43. A region of 100,000 people has 2,000 births, 500 deaths, 200 emigrants, and 100 immigrants over a 1-year period. Its population growth rate is
- (A) 1.2 percent
 - (B) 1.4 percent
 - (C) 1.6 percent
 - (D) 1.8 percent
 - (E) 2.0 percent
44. Over the past century, sagebrush has dramatically expanded its range over the Colorado Plateau's grasslands. This has been attributed to the overgrazing of the area's grasses by cattle and sheep. This example indicates that
- (A) grazing has no effect on the distribution of plants.
 - (B) sagebrush is the dominant competitor over grasses.
 - (C) the relationship between sagebrush and grasses is mutualistic.
 - (D) sagebrush could not exist anywhere in the absence of cattle and sheep.
 - (E) the range of sagebrush is normally limited by competition with grasses.
45. Using the rule of 70, a population growing at 10% would double in
- (A) 7 years
 - (B) 10 years
 - (C) 15 years
 - (D) 17 years
 - (E) 22 years
46. Population size can be estimated using the equation
- (A) Births + Immigration + Deaths + Emigration
 - (B) Births + Immigration – Deaths – Emigration
 - (C) Births + Immigration + Deaths – Emigration
 - (D) Births – Immigration – Deaths – Emigration
 - (E) Births – Immigration + Deaths – Emigration

47. Even if a country reduces its birth rate and maintains replacement-level fertility, its population will continue to grow for several decades because of

- (A) lower death rate.
- (B) increased income.
- (C) population momentum.
- (D) better health care.
- (E) increased life expectancy.

48. Measured on the Richter scale, an earthquake with a magnitude of 6.0 is _____ times greater than an earthquake with a magnitude of 2.0.

- (A) 10
- (B) 100
- (C) 1,000
- (D) 10,000
- (E) 100,000

49. Which of the following characteristics are typical of developed countries?

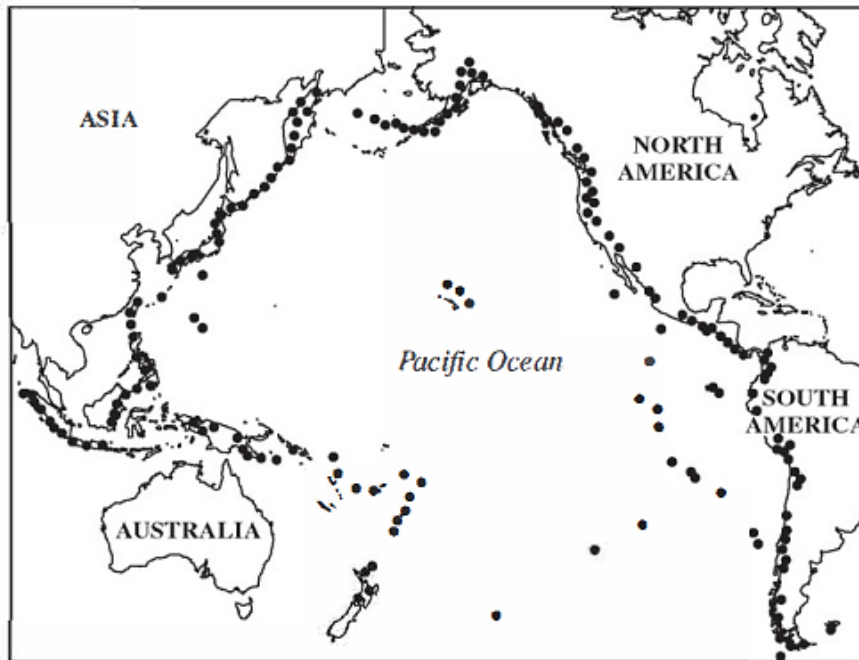
- I. High technology use
- II. Low GDP
- III. Small-scale sustainable agriculture

- (A) I only
- (B) II only
- (C) I and II only
- (D) II and III only
- (E) I, II and III

50. Which of the following statements about soil is NOT correct?

- (A) Soil often filters out pollutants that pass through it.
- (B) Soil is the medium for plant growth.
- (C) Soil is a primary filter of water.
- (D) A wide variety of organisms live in soil.
- (E) Soil is not involved in biogeochemical cycles.

FREE RESPONSE QUESTIONS



51. Plate-tectonic theory states that the Earth's lithosphere is broken into very slowly moving pieces or plates. Plate movements over vast stretches of time have led to the current orientation of our continents and oceans. Individual events along plate boundaries, such as earthquakes and volcanic eruptions, pose periodic threats to human activity and ecosystems. The "Ring of Fire" is a term that describes the location of increased seismic and volcanic activity around the margins of the Pacific Ocean basin. On the map above, each dot represents a volcano or an earthquake.
- a. Japan, Indonesia, and the Philippines are examples of volcanic island chains that have formed along subduction zones between plates in the western Pacific.
 - i. Describe what happens when two tectonic plates collide along a subduction zone.
 - ii. Explain how subduction leads to volcanic activity.
 - b. Although the landscape following a volcanic eruption may appear unable to support ecological communities, over time the area can be transformed through succession.
 - i. What is primary succession?
 - ii. Explain how primary succession can lead to soil formation on a newly formed volcanic landscape.

- c. In addition to volcanic activity, highly destructive tsunamis are generated along Pacific Plate subduction zones.
 - i. Explain how a tsunami is generated along a subduction zone.
 - ii. Describe one negative ecological impact that tsunamis have on coastal environments.

- d. Southern California experiences periodic devastating earthquakes along the San Andreas Fault, which is a transform boundary located along the eastern edge of the Pacific Plate.
 - i. Describe what happens to the tectonic plates along a transform boundary at the moment when an earthquake occurs.
 - ii. Describe what happens to the tectonic plates along a transform boundary during the time between earthquakes.

52. Biological diversity, or biodiversity, has become a topic of great concern among conservationists. Biodiversity is often used by scientists and policy makers to help determine the health of ecosystems.
- a. Describe TWO characteristics shared by ecosystems that have high biodiversity.
 - b. Identify TWO specific human activities that result in a loss of biodiversity, and explain how each activity lowers biodiversity.
 - c. For each human activity you discussed in (b), propose a practical strategy (other than simply banning the activity) to reduce the loss of biodiversity.
 - d. Describe ONE naturally occurring factor that could lead to a loss of biodiversity.
 - e. Describe TWO ecological benefits that greater biodiversity provides.
