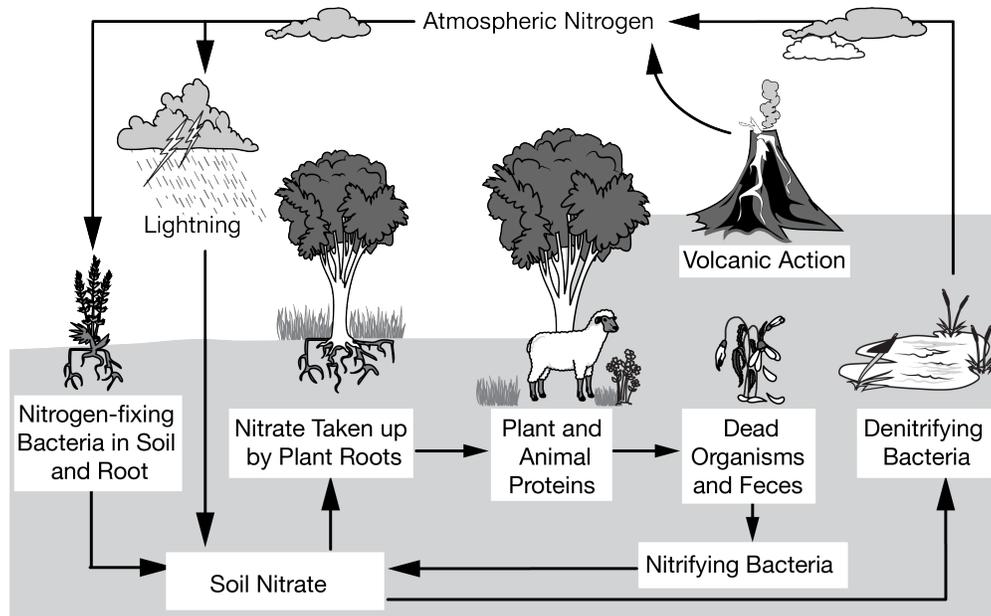


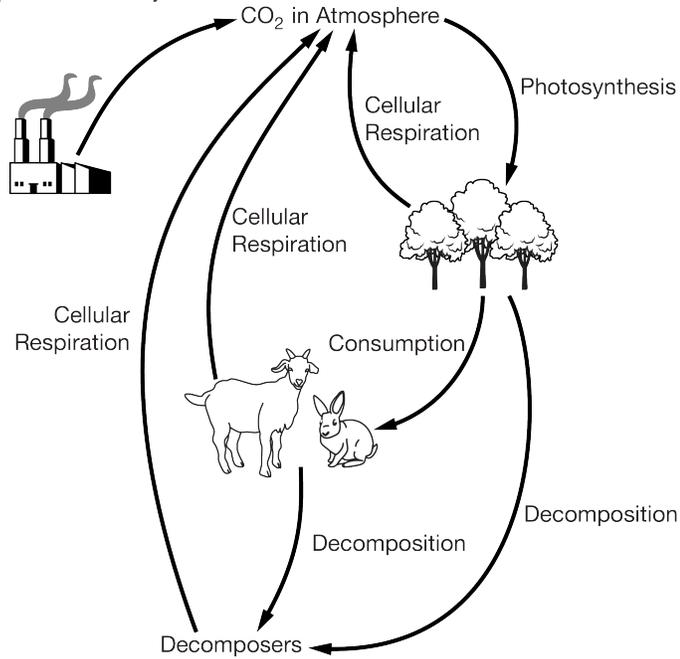
PART 1 – Multiple Choice Section (this is REQUIRED)

Unit 1 Review



- Which of the following pathways indicate how nitrogen is added to the largest nitrogen reservoir?
 - Nitrifying bacteria and lightning
 - Decomposing plant and animal material
 - Denitrifying bacteria and volcanic activity
 - Nitrates taken up by plant roots
- In which of the processes below is ammonia converted to nitrite, then to nitrate.
 - Nitrification
 - Denitrification
 - Assimilation
 - Ammonification
 - Nitrogen fixation
- The following question refer to the qualities of water samples. Select the choice that best fits the statement. Decreased by the breakdown of organic waste
 - Acidity
 - Turbidity
 - Hardness
 - Dissolved oxygen
 - Salinity
- Which of the following is true of carbon as it cycles in nature?
 - Carbon dioxide is released during photosynthesis.
 - Carbon compounds rarely exist in the gaseous state.
 - Carbon sinks include forests and oceans.
 - The carbon dioxide concentration in the atmosphere is reduced by cutting trees.
 - Carbon is concentrated in igneous rocks.

5. The diagram below shows a simplified carbon cycle.

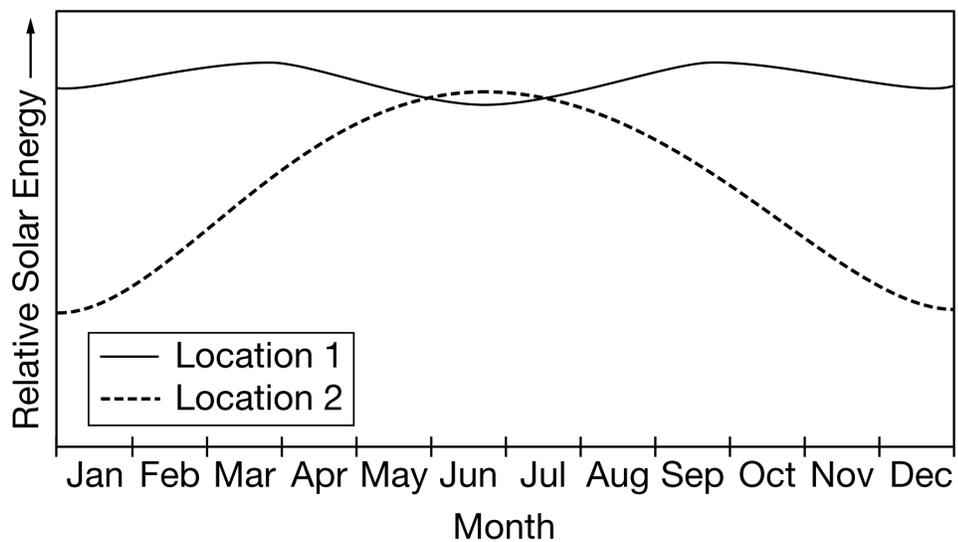


Which of the following major storage reservoirs of carbon, stored in the form of carbon dioxide, is not represented in this diagram?

- a. Algae
- b. Soil bacteria
- c. The Moon
- d. The ocean

6. The graph shows the relative solar energy received at local noon each day of the year at two different locations.

RELATIVE SOLAR ENERGY AMOUNTS
AT TWO LOCATIONS OVER A YEAR



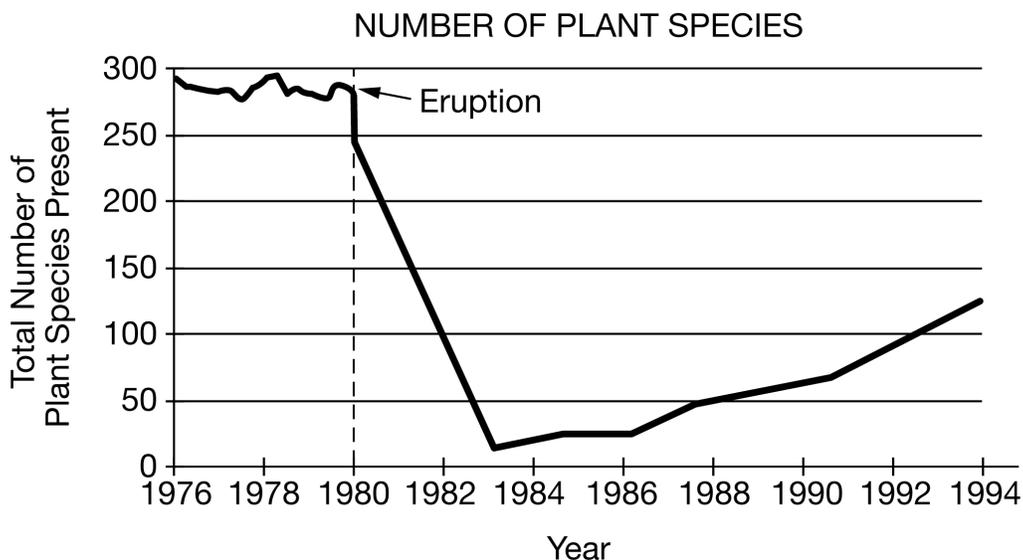
7. Location 1 is most likely located in which of the following terrestrial biomes?

- a. Taiga
- b. Tundra
- c. Tropical rain forest
- d. Temperate grassland

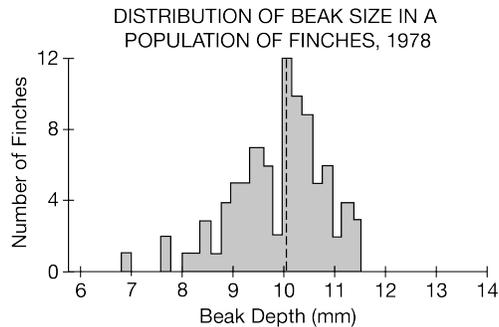
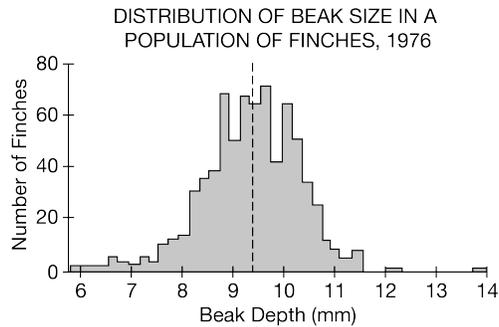
8. Open oceans produce the largest share of Earth's biomass because the net primary productivity (NPP) of the oceans is
 - a. high and thus can support a high proportion of producers
 - b. high and thus can support a high proportion of producers
 - c. low, but the large expanse of the oceans supports enormous numbers of producers such as phytoplankton
 - d. low, but the individual producers found there are huge in size
 - e. low, but still higher than that of other ecosystems of the world

Unit 2 Review

9. Which of the following best explains how environmental stressors, such as wildfires, can affect biodiversity in an ecosystem?
 - a. After an environmental stress, a genetic bottleneck may occur, which will increase genetic diversity.
 - b. Habitat diversity will increase the available niches if the landscape becomes more uniform after a disturbance.
 - c. Ecosystems with more species diversity are more likely to recover after a disturbance than ecosystems with low species diversity.
 - d. Smaller populations are less likely to go extinct than larger populations, so the species diversity will remain constant.
10. A one-hectare pond is sampled in early September. The sample yields 1 small catfish as well as 17 benthic invertebrates that represent 10 species. Which of the following can be estimated from the sample for the invertebrates in the pond?
 - a. The species richness
 - b. The pond's productivity
 - c. The uniformity of species distribution in the pond
 - d. The degree of disturbance
 - e. The stability of the ecosystem



11. Which of the following claims is best supported by the data in the graph?
 - a. The temperature of Earth rises and biodiversity increases immediately after a volcanic eruption.
 - b. The carrying capacity of plants in the area is approximately 250 species.
 - c. After the volcanic eruption, pioneer species colonized the area and the ecosystem began to undergo succession.
 - d. Plant species that are well adapted will survive and reproduce, leading to a change in the ecosystem biodiversity through the process of natural selection.



12. The graphs above show the population size and distribution of beak sizes in a finch population on the island of Daphne Major in the Galapagos in 1976 and 1978. Smaller-beaked finches are better suited for eating grasses and small seeds. Larger-beaked finches are better suited for cracking larger seeds and nuts. In 1977 a drought took place and the vegetation of the island was affected by the lack of rain. Which of the following was the number of finches in the population with a beak size of 10.2 mm in 1978?
- 8
 - 12
 - 40
 - 65
13. Which of the following would be categorized as a cultural ecosystem service of forests?
- Recreation and scenic areas for tourism
 - Timber and landscape materials
 - Mushroom and plant harvests
 - Soil stabilization and air purification

Unit 3 Review

14. Raccoons eat a variety of foods and can live in a variety of habitats, including locations near humans. Tiger salamanders eat an abundance of worms and insects and require wetland habitats so they do not dry out. Which of the following best identifies the two different species?
- Raccoons are decomposers, and tiger salamanders are scavengers.
 - Raccoons are carnivores, and tiger salamanders are herbivores.
 - Raccoons are generalists, and salamanders are specialists.
 - Raccoons have a Type II survivorship curve, and tiger salamanders have a Type I survivorship curve.

15. Which of the following species is most likely to provide extensive parental care to its offspring? Answer D

A

Species	Number of Fertilized Eggs Produced per Year
Oyster	5,000,000,000

B

Species	Number of Fertilized Eggs Produced per Year
Fish	8,000

C

Species	Number of Fertilized Eggs Produced per Year
Rabbit	12

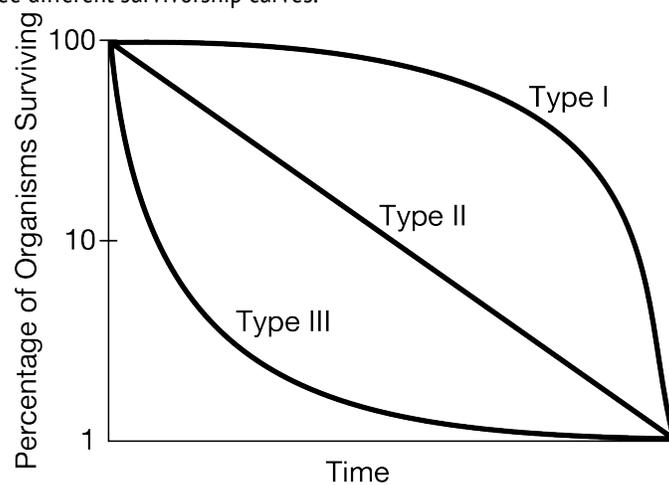
D

Species	Number of Fertilized Eggs Produced per Year
Bobcat	2

16. The K-selection reproductive strategy maximizes survival of offspring by producing

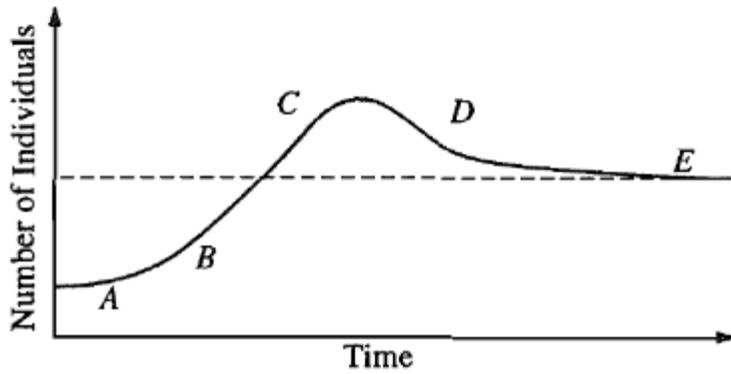
- few offspring with high levels of parental care
- few offspring with low levels of parental care
- many offspring with high levels of parental care
- many offspring with low levels of parental care
- many offspring without parental care

17. The graph below shows three different survivorship curves.



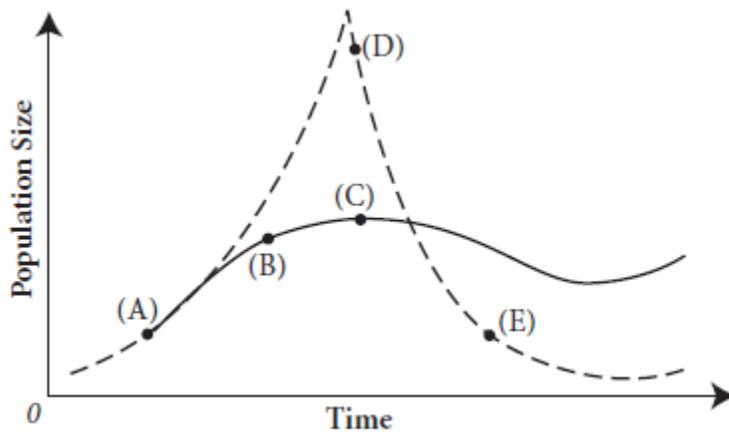
A certain species of dinosaur laid large numbers of eggs, and the hatchlings had high mortality early in life. But if they survived, the young dinosaurs were able to grow at a rapid pace and disperse into the environment in order to thrive. Based on this information and the graph above, which of the following best characterizes this species of dinosaur?

- The dinosaurs were r-strategists and exhibited a Type I survivorship curve.
- The dinosaurs were r-strategists and exhibited a Type III survivorship curve.
- The dinosaurs were K-strategists and exhibited a Type II survivorship curve.
- The dinosaurs were K-strategists and exhibited a Type I survivorship curve.

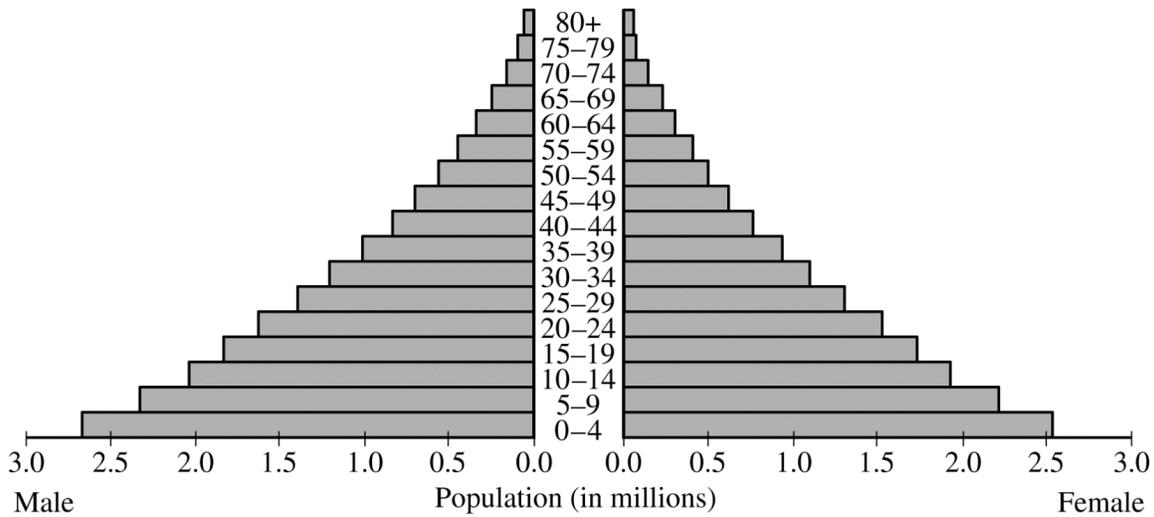


18. The diagram above illustrates how the number of individuals in a population changed with time as a result of external stresses and resource limitations. Which lettered portion of the curve most likely corresponds to the carrying capacity of the ecosystem?
- A
 - B
 - C
 - D
 - E

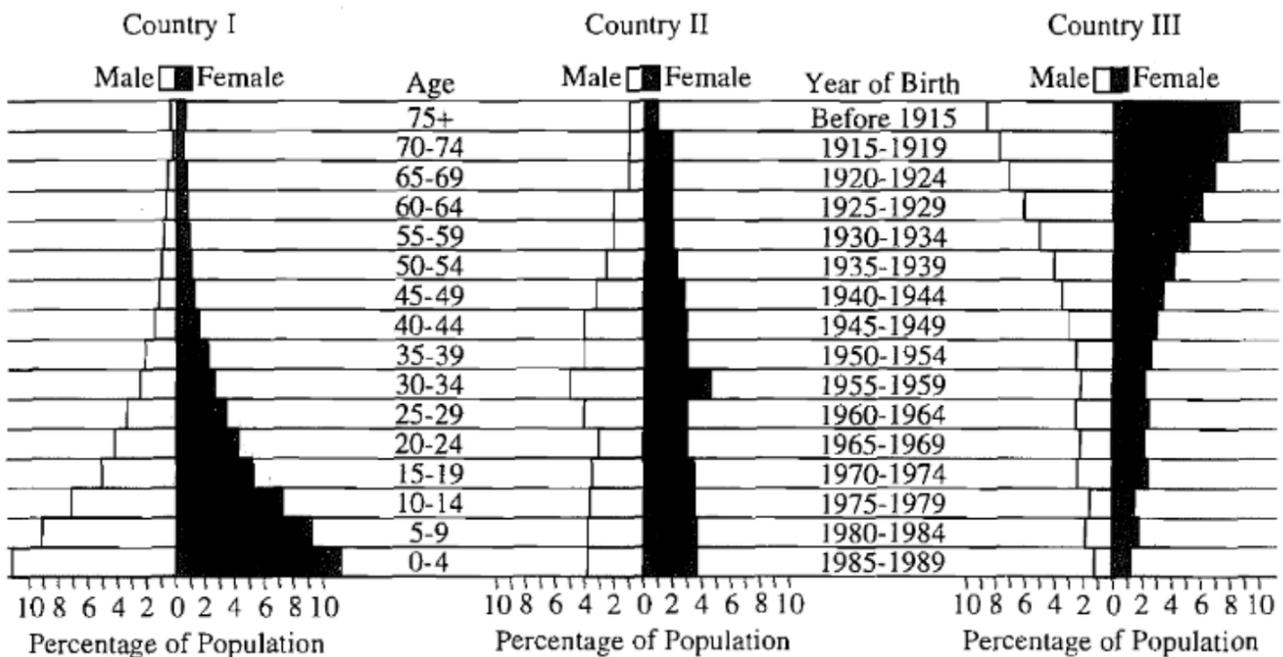
The following questions refer to the lettered points of the curves plotted on the graph below. The curves show two possible patterns of change in population size over time for a certain species of small mammal in an ecosystem.



19. Which represents a population growing at a decreasing rate?
- A
 - B
 - C
 - D
 - E
20. Which represents a population growing exponentially?
- A
 - B
 - C
 - D
 - E



21. The diagram above shows the age structure of a particular country. Which of the following characteristics is most closely associated with a country that demonstrates the age structure in the diagram shown above?
- There is a low infant mortality rate.
 - A high percentage of the population has access to medical care.
 - There is a low population growth rate.
 - There is a high total fertility rate.



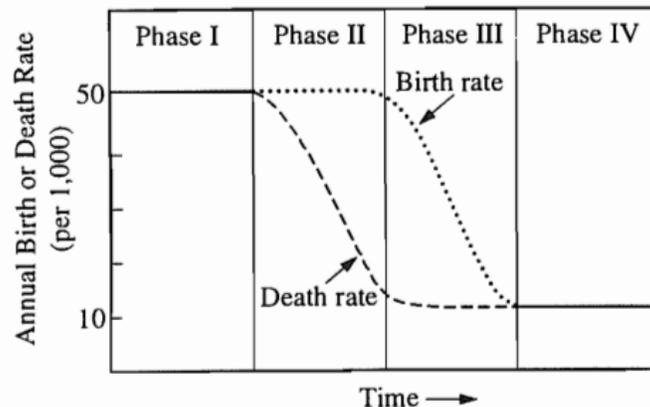
22. The following question refers to the histograms above, which show age structure expressed as percentage of population for Countries I, II, and II in 1990. Approximately what percent of the population in Country II is under age 15?
- 1%
 - 5%
 - 10%
 - 25%
 - 50%

23. Which of the following is a true statement about the total fertility of a society?
- The total fertility of a society is the difference between the crude birth rate and the crude death rate.
 - The total fertility of a society is the number of children necessary for a couple to replace themselves in the next generation.
 - The total fertility of a society is positively correlated with the average education of women.
 - The total fertility of a society is negatively correlated with the number of women of child-bearing age.
 - The total fertility of a society decreases as the society progresses through the demographic transition.

POPULATION DATA FOR FOUR DIFFERENT COUNTRIES, 2015

Country	Population (millions)	Births (per 1,000 individuals)	Deaths (per 1,000 individuals)	Total Fertility Rate	Infant Mortality Rate (per 1,000 births)	Life Expectancy at Birth (years)
A	39.9	26	6	3.0	21	74
B	25.7	45	13	5.9	83	54
C	1.4	15	2	2.1	76	76
D	50.7	9	5	1.5	3.0	82

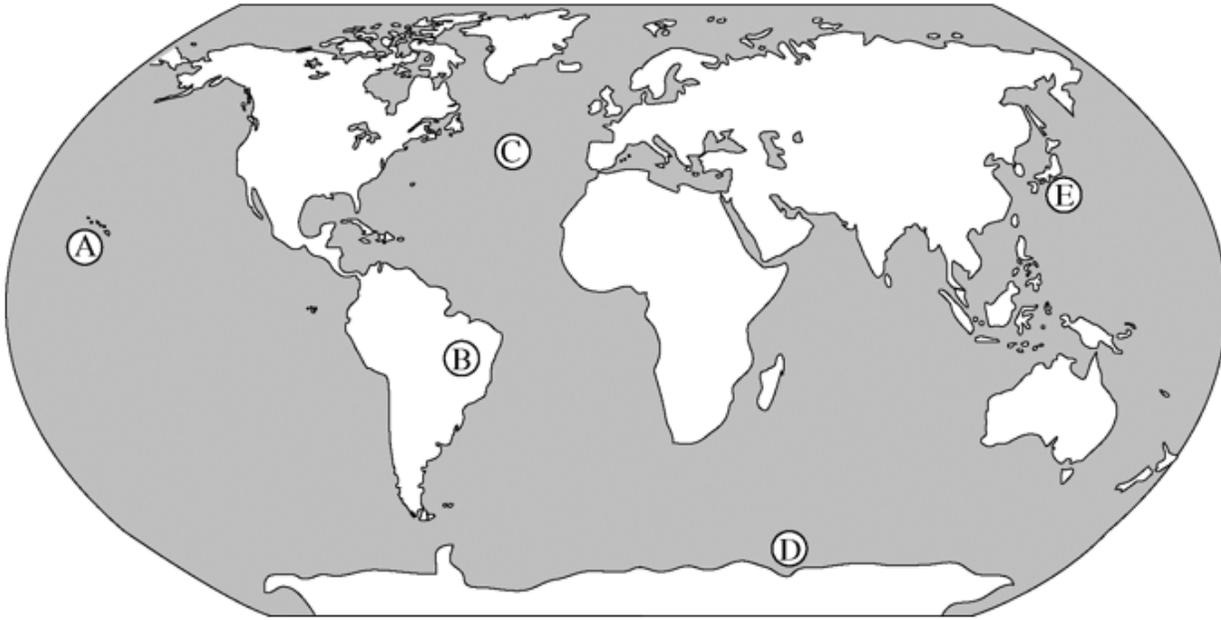
24. The total fertility rate in country A was 6.8 in 1980. Which of the following statements best supports the change in the total fertility rate in country A between 1980 and 2015?
- The total fertility rate increased as a result of improved health care and better nutrition.
 - The total fertility rate remained constant even though there was improved access to clean water.
 - The total fertility rate decreased as a result of a delay in age of first marriage and increased contraceptive use.
 - The total fertility rate decreased as a result of increased infant mortality rate.
25. If the population of a country grows at a rate of approximately 5 percent per year, the number of years required for the population to double is closest to
- 5 years
 - 10 years
 - 15 years
 - 25 years
 - 35 years



26. Using the graph above that shows different phases related to the birth and death rates for a typical human population over time. Which of the following is most likely the primary cause of high death rates in phase I?
- Loss of breeding-age males due to warfare
 - Loss of breeding-age females due to disease
 - Large percentage of elderly individuals in the population
 - Infant and childhood mortality
 - General starvation due to famine

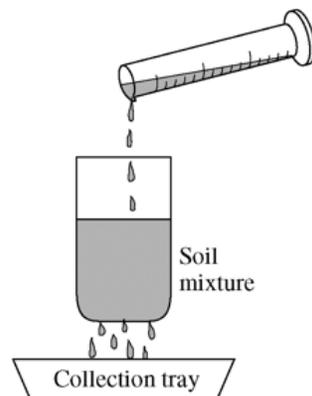
27. Which of the following is most typically associated with the transition from a rural to an urbanized society?
- a. Reduced birth rates
 - b. Reduced need for sewage-treatment facilities
 - c. Increased rates of population growth
 - d. Increased air quality in urban areas
 - e. Increased stabilization of microclimate in urban areas

Unit 4 Review

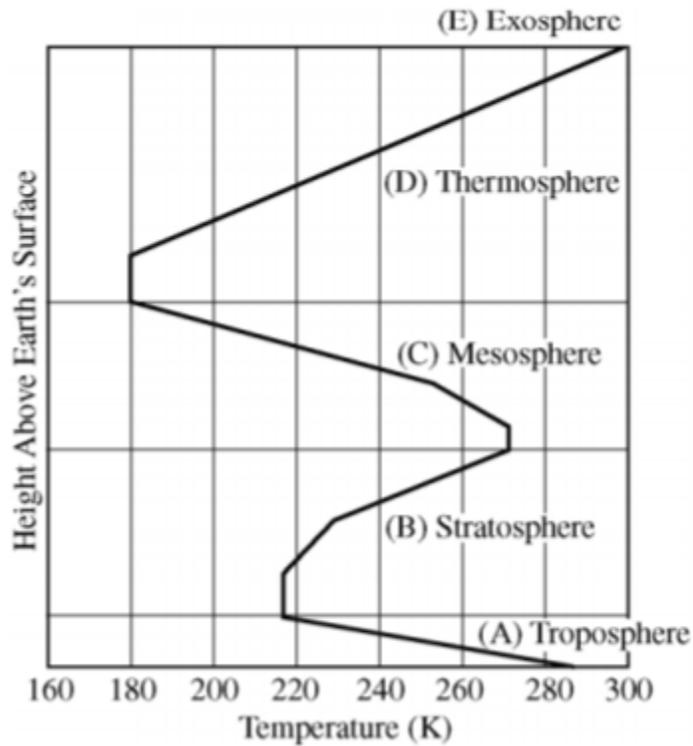


28. Refer to the locations marked by letters on the world map below. The location where new crust is being created at a divergent plate boundary
- a. A
 - b. B
 - c. C
 - d. D
 - e. E
29. The location where one tectonic plate is being forced beneath another, creating a volcanic arc.
- a. A
 - b. B
 - c. C
 - d. D
 - e. E

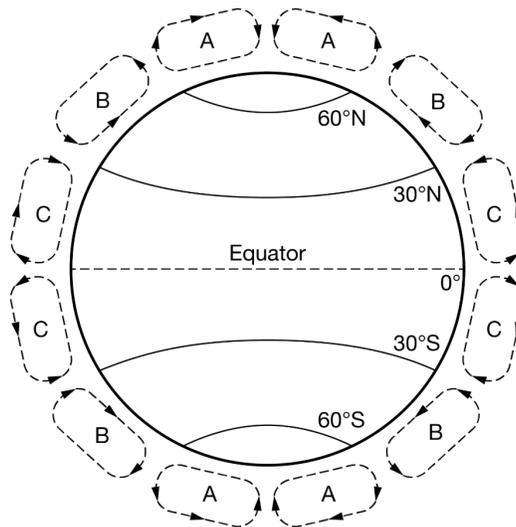
30. Students want to determine the impact of soil erosion from the development of new housing. They plan to measure the density of a species of algae growing along the bottom of a river that flows through their town. The town is built in a heavily forested area, but a large area of trees along the river was recently clear-cut to allow for the construction of a new housing development, which has caused exposed soil to wash into the river. The river flows north to south through the town and is still forested both up- and downstream of the town.
- Which of the following explains the variable that would be the best for students to measure to determine the direct impact of soil erosion caused by the construction project on the river?
 - Water temperature, because a decrease in shading in the area would indicate an increase in soil erosion.
 - Nutrient levels, because a decrease in nitrogen and phosphorus would indicate an increase in soil erosion.
 - The pH level, because an increase in pH would indicate an increase in soil erosion.
 - Turbidity, because a decrease in water clarity would indicate an increase in soil erosion.
31. Which of the following is shown in the rapid rate of this process in tropical forests results in low-nutrient soils
- Photosynthesis
 - Eutrophication
 - Denitrification
 - Decomposition
 - Transpiration
32. Which of the following is the correct order of soil particles in order of increasing size?
- Clay–sand–silt
 - Clay–silt–sand
 - Sand–clay–silt
 - Sand–silt–clay
 - Silt–clay–sand



33. The following question refers to the diagram above, which shows 100 ml of water being poured through a soil sample. After the water has passed through the soil, 98 ml of water is measured in the collection tray below the sample. Which of the following properties of the soil sample most influences the flow of water through the sample?
- Color
 - Fertility
 - Permeability
 - pH
 - Salinity

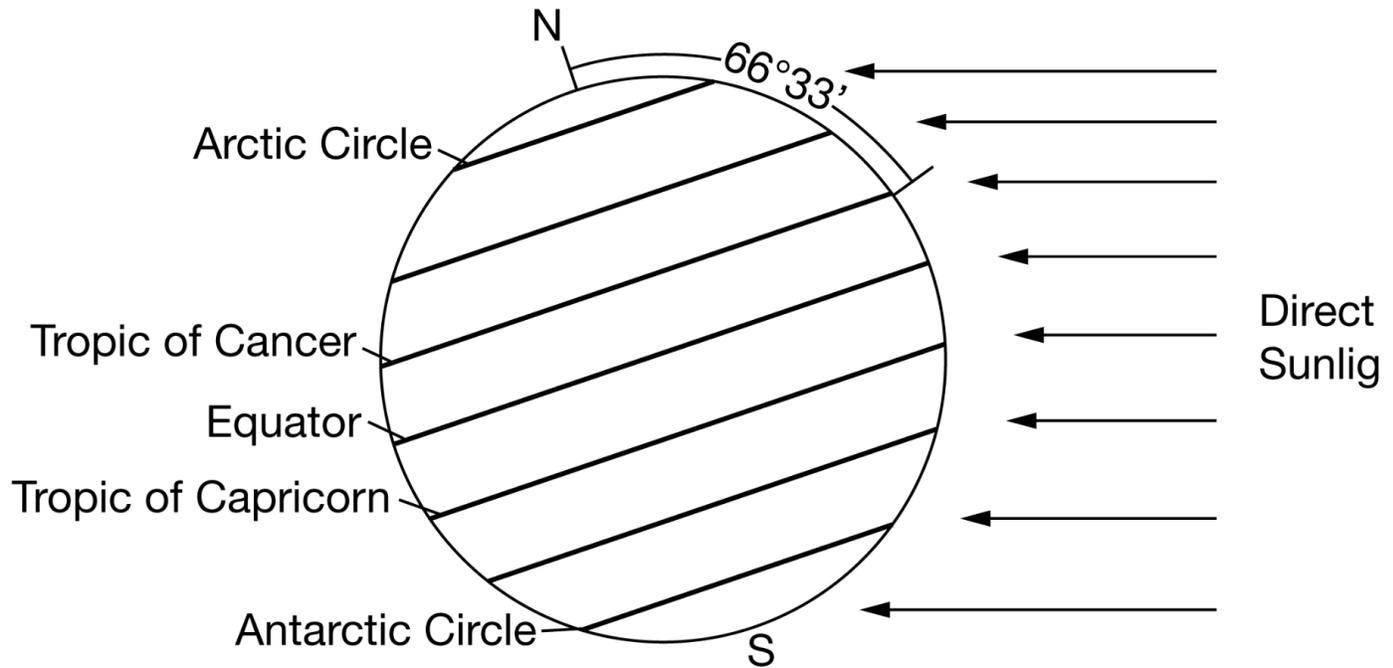


34. The following question refers to the layers of Earth's atmosphere in the temperature profile shown above. The region with the lowest atmospheric pressure is:
- Troposphere
 - Stratosphere
 - Mesosphere
 - Thermosphere
 - Exosphere

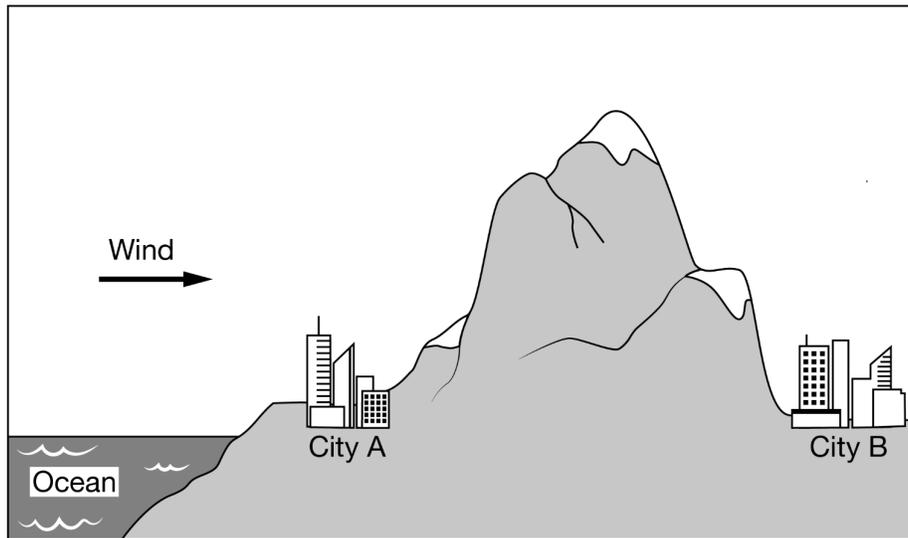


35. The diagram above is an illustration of global atmospheric circulation. Which of the following causes the air to rise high into the atmosphere in the areas labeled A, B, and C on the diagram?
- El Niño circulation patterns
 - The rotation of Earth shifting the direction of the air upward
 - Warm, moist air that is less dense than the surrounding air
 - Rain shadows over mountain ridges

36. Which of the following best describes why understanding a watershed and its boundaries is important in designing housing developments along a river?
- The water contained in a watershed is more likely to become polluted if the soil has high permeability, so it is important to locate all point sources to reduce contamination.
 - Watersheds provide habitats for hundreds of marine species, so it is important to protect their feeding and nesting sites when designing housing for humans.
 - Watersheds provide space for cultivating land to produce food and other products, so it is important to avoid locating a housing development on the most fertile land.
 - Surface water and stormwater runoff will drain downstream within the watershed boundaries, so it is important to understand the flow of water through the watershed.



37. The axis of Earth in relation to the Sun is tilted at a 23.5 degree slant, as illustrated in the diagram above. Which of the following areas receives the most intense solar radiation at the time of year shown in the diagram, and why?
- The Antarctic Circle, because it is closest to the Sun.
 - The Tropic of Capricorn, because this latitude is nearly horizontal to incoming solar radiation.
 - The equator, because it is the hottest region and therefore receives the most intense solar radiation.
 - The Tropic of Cancer, because solar radiation spreads out over a wider area at this latitude.



38. Which of the following best explains why City B regularly receives less precipitation than City A?
- As air rises up the side of the mountain near City B, the temperature and the relative humidity increase, causing increased precipitation on the other side of the mountain over City A.
 - Air that is forced upward on the side of the mountain near City B leads to the formation of stratospheric clouds.
 - The urban heat island from City B causes a warmer climate that leads to reduced cloud formation.
 - The rain shadow effect causes City B to be drier because the mountain blocks precipitation from reaching the city.
39. *El Niño*, a periodic warming of ocean surface waters, occurs in which of the following regions?
- Tropical East Pacific
 - Gulf of Mexico
 - Arctic North Pacific
 - Temperate West Atlantic
 - Tropical Indian Ocean
40. Which of the following is the most likely effect of a strong El Niño event on the weather patterns in the United States?
- Wetter weather and cooler temperatures in the Pacific Northwest and warmer temperatures with more snow in the northeastern states
 - Drier weather in the western states and wetter weather in the eastern states
 - Wetter weather and cooler than average temperatures in the southeastern states and warmer temperatures in the Pacific Northwest
 - Overall warmer temperatures and drier conditions throughout the entire United States

PART 1 – Free Response Question (this is REQUIRED)

Haiti shares a border with the Dominican Republic on the Caribbean island of Hispaniola.

(a) The border between the two countries can be seen using satellite images because of the severe deforestation in Haiti.

Provide one reason why deforestation commonly occurs in a less developed country such as Haiti.

Describe one realistic strategy to reduce deforestation in a less developed country.

(b) Deforestation can affect water quality. **Identify** one change that can occur in the water quality of streams within a watershed that has been deforested. **Explain** how deforestation can lead to this change.

(c) **Identify** TWO environmental benefits, other than those related to water quality, of maintaining forest ecosystems.

The table below contains demographic data for Haiti in 1995 and 2015.

DEMOGRAPHIC DATA FOR HAITI

Measure	1995	2015
Fertility rate (number of children per woman)	5.2	2.7
Life expectancy (years)	55	64
Infant mortality (deaths per 1,000)	85	48

(d) **Identify** and **discuss** one factor in a less developed country that could contribute significantly to a change in life expectancy, similar to what occurred in Haiti from 1995 to 2015.

(e) **Identify** and **discuss** one economic or cultural factor in a less developed country that could contribute significantly to a change in the fertility rate, similar to what occurred in Haiti from 1995 to 2015.

