#### Study Island

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#### Environmental Change

**1.** An increase in the atmospheric levels of carbon dioxide (CO2) is the biggest contributor to which of the following?

|  |  |  |
| --- | --- | --- |
|  | **A.** | global warming |

|  |  |  |
| --- | --- | --- |
|  | **B.** | El Niño |

|  |  |  |
| --- | --- | --- |
|  | **C.** | ozone depletion |

|  |  |  |
| --- | --- | --- |
|  | **D.** | wind storms |

#### Organism Interactions & Population Dynamics

**2.** Which of the following are possible causes of extinction?

|  |  |
| --- | --- |
| I. | climate change |
| II. | catastrophic events |
| III. | biological factors |
| IV. | human impact |

|  |  |  |
| --- | --- | --- |
|  | **A.** | I, II, III, and IV |

|  |  |  |
| --- | --- | --- |
|  | **B.** | I, II, and IV only |

|  |  |  |
| --- | --- | --- |
|  | **C.** | II, III, and IV only |

|  |  |  |
| --- | --- | --- |
|  | **D.** | I, III, and IV only |

#### Organism Interactions & Population Dynamics

**3.** A rodent population in a forest ecosystem contains every member of that species. These rodents eat a variety of plants and live in hardwood trees. Their population growth is limited by the amount of space they have available.  
  
Human construction in the area is steadily reducing the habitat of the rodent species. Which of the following will most likely occur if the species' habitat continues to be destroyed?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The limiting factor of the population will change. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The species will experience population growth. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The population will use less resources and stay the same size. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The species will eventually become extinct. |

#### Environmental Change

**4.** The zebra mussel is a non-native species of freshwater mussel that has firmly established populations throughout the Great Lakes. It is originally from southern Russia.  
  
Zebra mussels breed quickly and can attach to any hard surface. Their shells can attach to each other in layers that clog pipes and waterways. They can also kill native mussels by attaching to their shells. However, zebra mussels are also very good at filtering the water. Many lakes infested with zebra mussels are cleaner.  
  
Which statement about non-native species is supported by the story about zebra mussels?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The positive impact of non-native species always outweighs the negative. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Non-native species can have both positive and negative effects. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Non-native species can only come from nearby ecosystems. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The impact that non-native species have on other ecosystems is small. |

#### Environmental Change

**5.** Deforestation increases the amount of water runoff, which increases the rate of

|  |  |  |
| --- | --- | --- |
|  | **A.** | soil erosion. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | precipitation. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | evaporation. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | acid rain. |

#### Environmental Change

**6.** As a result of worldwide human population growth, many countries are exploring the use of alternative energy sources. One potential energy source is nuclear power.  
  
In nuclear power plants, atoms are split during fission reactions to produce heat. This heat then changes water to steam, and the steam is used to turn a turbine, so electricity is generated. The heat that is produced by nuclear reactions is so great that the areas in which these reactions occur must be cooled to keep the reactor stable.  
  
In what way do nuclear reactors negatively affect ecosystems?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Nuclear reactors increase air pollution. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Nuclear reactors add large amounts of solid waste to landfills. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Nuclear reactors increase thermal pollution. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Nuclear reactors produce greenhouse gases. |

#### Ecosystems & Biomes

**7.** Select the list below that would best exemplify a community.

|  |  |  |
| --- | --- | --- |
|  | **A.** | bees and wasps around a group of purple cornflowers |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a warm, humid climate with plenty of rainfall |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a school of sunfish |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a nest of mockingbirds, some bullfrogs, a pond, and a sandy shore |

#### Organism Interactions & Population Dynamics

**8.** Many types of sea stars eat mussels and other shellfish. Suppose an oil spill causes thousands of mussels in an area to die. How will this most likely affect the area's sea star population?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The sea star population will decrease in size. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The sea star population will not be affected. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The sea star population will adapt to feed on algae and other microorganisms. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The sea star population will increase in size. |

#### Environmental Change

**9.** Recently, zebra mussels were found in Colorado's Lake Pueblo. Zebra mussels are not native to the lakes in Colorado, and they feed heavily on the algae and microscopic animals that form the base of the lake's food web.   
  
If the spread of zebra mussels cannot be contained, what will be the likely effect on Lake Pueblo's ecosystem?

|  |  |
| --- | --- |
| I. | There will be no effect because there is always room for another organism. |
| II. | The fish population in the lake will decline because of competition for food. |
| III. | In time, a new type of bird adapted to crack mussel shells may appear. |
| IV. | Populations of second-order and third-order consumers may decline. |

|  |  |  |
| --- | --- | --- |
|  | **A.** | II, III, and IV only |

|  |  |  |
| --- | --- | --- |
|  | **B.** | II and IV only |

|  |  |  |
| --- | --- | --- |
|  | **C.** | I only |

|  |  |  |
| --- | --- | --- |
|  | **D.** | II and III only |

#### Ecosystems & Biomes

**10.** In the \_\_\_\_\_\_\_ biome, the vegetation is so abundant and thick that almost no sunlight reaches the soil.

|  |  |  |
| --- | --- | --- |
|  | **A.** | grassland |

|  |  |  |
| --- | --- | --- |
|  | **B.** | temperate deciduous forest |

|  |  |  |
| --- | --- | --- |
|  | **C.** | tropical rainforest |

|  |  |  |
| --- | --- | --- |
|  | **D.** | savanna |

#### Organism Interactions & Population Dynamics

**11.** Microorganisms can mutate and evolve very quickly compared to most multicellular organisms. This allows pathogenic microorganisms to infect new species. Suppose a very harmful microorganism that is quite successful at infecting hardwood trees is introduced into a forest ecosystem.   
  
What effect would this pathogenic microorganism most likely have?

|  |  |  |
| --- | --- | --- |
|  | **A.** | It would disrupt the ecosystem by infecting and killing the populations of all the species. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | It would maintain the balance of the ecosystem by reducing the population of one species. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | It would maintain the balance of the ecosystem by reducing the populations of all the species. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | It would disrupt the ecosystem by greatly reducing the population of a few species. |

#### Earth's Cycles

**12.** Which of the following types of organisms break down dead plant and animal matter and return carbon dioxide to the atmosphere?

|  |  |  |
| --- | --- | --- |
|  | **A.** | producers |

|  |  |  |
| --- | --- | --- |
|  | **B.** | decomposers |

|  |  |  |
| --- | --- | --- |
|  | **C.** | scavengers |

|  |  |  |
| --- | --- | --- |
|  | **D.** | consumers |

#### Earth's Cycles

**13.** Models are often used to explain scientific knowledge or experimental results.  
  
A model of the carbon cycle is shown below.

Which of the following can be determined based on this model?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The atmosphere is the only reservoir on Earth that can store carbon in any form. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Factories do not emit any amount of carbon dioxide into the atmosphere. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Dead organisms and waste products do not play any role within the carbon cycle. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Both plants and animals release carbon dioxide into the atmosphere during cellular respiration. |

#### Energy Flow in Ecosystems

**14.** What is the ultimate source of energy for all ecosystems?

|  |  |  |
| --- | --- | --- |
|  | **A.** | plants |

|  |  |  |
| --- | --- | --- |
|  | **B.** | the Sun |

|  |  |  |
| --- | --- | --- |
|  | **C.** | primary consumers |

|  |  |  |
| --- | --- | --- |
|  | **D.** | secondary consumers |

#### Energy Flow in Ecosystems

**15.** The diagram below shows an energy pyramid.

Which of the following best explains why the number of organisms at each level decreases while moving up the energy pyramid?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The animals at each level have more predators, so they produce more offspring. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The animals at each level use energy, so only a small amount of their energy is available to the next level. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The animals at higher levels are more competitive, so fewer animals survive. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The animals at higher levels move more than animals at lower levels, so they require more energy. |

#### Ecosystems & Biomes

**16.** Select the list below that would best exemplify a population.

|  |  |  |
| --- | --- | --- |
|  | **A.** | a warm, humid climate with plenty of rainfall |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a school of sunfish |

|  |  |  |
| --- | --- | --- |
|  | **C.** | bees and wasps around a group of purple cornflowers |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a nest of mockingbirds, some bullfrogs, a pond, and a sandy shore |

#### Earth's Cycles

**17.** Most of the Earth's oxygen occurs in the form of minerals in the crust and mantle. The oxygen that is available in the atmosphere is used primarily by plants, animals, and bacteria to perform cellular respiration.  
  
Why is running out of oxygen still not a real concern?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Lightning creates large quantities of ozone, which quickly breaks down into oxygen molecules. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Oxygen is recycled through the interrelated processes of photosynthesis and cellular respiration. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The Sun creates more than enough new oxygen atoms in the atmosphere by splitting phosphate molecules. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Oxygen can easily be mined from rocks and sand and then be released into the atmosphere. |

#### Environmental Change

**18.** Which human activity has had the greatest impact on climate change?

|  |  |  |
| --- | --- | --- |
|  | **A.** | deforestation |

|  |  |  |
| --- | --- | --- |
|  | **B.** | production of nuclear waste |

|  |  |  |
| --- | --- | --- |
|  | **C.** | burning fossil fuels |

|  |  |  |
| --- | --- | --- |
|  | **D.** | building skyscrapers |

#### Ecosystems & Biomes

**19.** Which of the following best describes an ecosystem?

|  |  |  |
| --- | --- | --- |
|  | **A.** | all the living organisms in an area |

|  |  |  |
| --- | --- | --- |
|  | **B.** | all the living organisms in an area and their physical surroundings |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a region with a distinct climate |

|  |  |  |
| --- | --- | --- |
|  | **D.** | all the living organisms of the same species throughout the world |

#### Organism Interactions & Population Dynamics

**20.** The American bullfrog is native to much of the eastern United States. This species has successfully begun to spread west as an invasive species. It is thriving in the western United States because of its large size, high mobility, and tremendous reproductive capabilities.  
  
American bullfrogs have very generalized eating habits and often eat the same food sources as the native frog species in the western United States, causing a reduction in the overall food supply.  
  
The relationship between the American bullfrog and native frog species in the western United States can best be characterized as \_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
|  | **A.** | parasitism |

|  |  |  |
| --- | --- | --- |
|  | **B.** | mutualism |

|  |  |  |
| --- | --- | --- |
|  | **C.** | predation |

|  |  |  |
| --- | --- | --- |
|  | **D.** | competition |

#### Environmental Change

**21.** Which statement explains the impact that ozone depletion has had on the Earth?

|  |  |  |
| --- | --- | --- |
|  | **A.** | It has decreased surface levels of ultraviolet light. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | It has decreased the production of ultraviolet light. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | It has increased surface levels of ultraviolet light. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | It has increased the production of ultraviolet light. |

#### Energy Flow in Ecosystems

**22.** The Antarctic food web is less complex than other food webs around the world. There are fewer different species that are part of it. However, there are more of each species.

According to the food web shown, which organism is both a primary consumer and a secondary consumer?

|  |  |  |
| --- | --- | --- |
|  | **A.** | other herbivorous zooplankton |

|  |  |  |
| --- | --- | --- |
|  | **B.** | krill |

|  |  |  |
| --- | --- | --- |
|  | **C.** | other seals |

|  |  |  |
| --- | --- | --- |
|  | **D.** | fish |

#### Earth's Cycles

**23.** Technology Enhanced Questions are not available in Word format.

#### Ecosystems & Biomes

**24.**

A desert biome is pictured above. Which is an abiotic factor that can be found in this biome?

|  |  |  |
| --- | --- | --- |
|  | **A.** | sand |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a cactus |

|  |  |  |
| --- | --- | --- |
|  | **C.** | an insect |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a lizard |

#### Environmental Change

**25.** In which of the following ways might humans negatively impact the environment?

|  |  |
| --- | --- |
| I. | depleting the natural resources of the environment |
| II. | destroying habitats to make room for a growing population |
| III. | planting more trees to make up for those previously cut down |

|  |  |  |
| --- | --- | --- |
|  | **A.** | I and III only |

|  |  |  |
| --- | --- | --- |
|  | **B.** | I and II only |

|  |  |  |
| --- | --- | --- |
|  | **C.** | II and III only |

|  |  |  |
| --- | --- | --- |
|  | **D.** | I, II, and III |

#### Energy Flow in Ecosystems

**26.** Technology Enhanced Questions are not available in Word format.

#### Environmental Change

**27.** Severe acid rain caused by factory emissions can erode the leaves of plants. Which statement best explains why this would harm the plant life?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Nitrogen compounds needed for growth would not be available. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Water needed for growth would not be able to be taken up from the soil. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Insects needed for pollination would not be attracted to the plants. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Sunlight needed for energy would not be able to be absorbed. |

#### Ecosystems & Biomes

**28.**

Which of the following are abiotic factors that can be found in the ecosystem pictured?

|  |  |
| --- | --- |
| I. | ocean currents |
| II. | fish |
| III. | plankton |
| IV. | sand |

|  |  |  |
| --- | --- | --- |
|  | **A.** | II and III only |

|  |  |  |
| --- | --- | --- |
|  | **B.** | I and IV only |

|  |  |  |
| --- | --- | --- |
|  | **C.** | II, III, and IV only |

|  |  |  |
| --- | --- | --- |
|  | **D.** | I, II, and III only |

#### Environmental Change

**29.** The gypsy moth is a species native to Europe that has been brought to the United States. It prefers to feed on oak trees in the U.S., and its caterpillars can consume all of the leaves off of trees. This leads to tree death after a few years of repeated defoliation.   
  
Why is the gypsy moth able to do so much damage to trees in the United States?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The ecosystems found in the United States are less stable than those in Europe. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | It is a parasite and therefore does not need its host to survive. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The gypsy moth is a uniquely dangerous species of insect around the world. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | It is a non-native species and therefore has fewer predators. |

#### Earth's Cycles

**30.** The diagram below depicts the water cycle.

Which process is represented by the number 4?

|  |  |  |
| --- | --- | --- |
|  | **A.** | condensation |

|  |  |  |
| --- | --- | --- |
|  | **B.** | precipitation |

|  |  |  |
| --- | --- | --- |
|  | **C.** | evaporation |

|  |  |  |
| --- | --- | --- |
|  | **D.** | surface runoff |

#### Environmental Change

**31.** In 1883, the volcanic island of Krakatau in Indonesia erupted so violently that the eruption could be heard over 3,000 kilometers away. The eruption spewed massive amounts of ash and volcanic gases into the atmosphere.   
  
Which of the following was the most likely result of this volcanic eruption?

|  |  |  |
| --- | --- | --- |
|  | **A.** | a mass extinction of plants and animals |

|  |  |  |
| --- | --- | --- |
|  | **B.** | the reversing of Earth's magnetic poles |

|  |  |  |
| --- | --- | --- |
|  | **C.** | the formation of tsunamis for several months following the eruption |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a global drop in temperature for several months following the eruption |

#### Ecosystems & Biomes

**32.** A biome is a broad category of ecological organization that includes all of the biotic and abiotic components of an entire climate region, such as a desert or a rainforest.  
  
Which of the following categories of ecological organization is broader than a biome?

|  |  |  |
| --- | --- | --- |
|  | **A.** | a population |

|  |  |  |
| --- | --- | --- |
|  | **B.** | an ecosystem |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a community |

|  |  |  |
| --- | --- | --- |
|  | **D.** | the biosphere |

#### Environmental Change

**33.** Human beings are part of Earth's ecosystems. Thus, human activities can, deliberately or unintentionally, alter the equilibrium in ecosystems.  
  
Humans often change ecosystems as a result of population growth, consumption, and technology. Which of the following exemplifies a way in which humans modify ecosystems?

|  |  |  |
| --- | --- | --- |
|  | **A.** | factory and automotive emissions causing acid rain |

|  |  |  |
| --- | --- | --- |
|  | **B.** | cutting down trees to build new buildings and roads |

|  |  |  |
| --- | --- | --- |
|  | **C.** | redirecting and storing freshwater behind dams |

|  |  |  |
| --- | --- | --- |
|  | **D.** | all of these |

#### Organism Interactions & Population Dynamics

**34.** Overpopulation occurs when a population exceeds its carrying capacity. White-tailed deer are considered to be an overpopulated species in the central United States.  
  
What is one consequence of white-tailed deer exceeding their carrying capacity?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The deer have stopped breeding. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | There are more predators to eat the deer. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The deer are less healthy and more prone to disease. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | People don't see deer as often in urban areas. |

#### Environmental Change

**35.** Technology Enhanced Questions are not available in Word format.

#### Energy Flow in Ecosystems

**36.** What happens to the chemical elements that make up the molecules of living things as they pass through a food web?

|  |  |  |
| --- | --- | --- |
|  | **A.** | All of their energy is dissipated as heat. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | They are not transferred at all. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | They remain intact in their original structures. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Some of their energy is stored in newly made structures. |

#### Environmental Change

**37.** In 2009, there were approximately 6.8 billion people in the world. In order to keep up with the food demands of this large human population, farmers used fertilizers and other agricultural technologies to grow and harvest more food. How do fertilizers negatively impact the environment?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Fertilizers are difficult to apply and require heavy machinery which damage land. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The rate of nutrient depletion increases in soil that has been fertilized. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Run-off from fertilized land increases nitrogen levels in ecosystems and encourages algal growth. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Fertilizers allow crops to grow bigger and faster, so they can feed more people. |

#### Earth's Cycles

**38.** The diagram above depicts the nitrogen cycle.  
  
According to this diagram, which of the following organisms is primarily responsible for nitrogen-fixation?

|  |  |  |
| --- | --- | --- |
|  | **A.** | fungi |

|  |  |  |
| --- | --- | --- |
|  | **B.** | trees |

|  |  |  |
| --- | --- | --- |
|  | **C.** | bacteria |

|  |  |  |
| --- | --- | --- |
|  | **D.** | cows |

#### Energy Flow in Ecosystems

**39.** Green plants are the first living organism in a food chain. Where do plants get the energy that they pass along to the primary consumers in their food chains?

|  |  |  |
| --- | --- | --- |
|  | **A.** | from other plants |

|  |  |  |
| --- | --- | --- |
|  | **B.** | from decomposers |

|  |  |  |
| --- | --- | --- |
|  | **C.** | from the Sun |

|  |  |  |
| --- | --- | --- |
|  | **D.** | from secondary consumers |

#### Energy Flow in Ecosystems

**40.** The food chain below shows an example of how energy flows through an ecosystem.

What is the ultimate source of all of the energy that flows through this food chain?

|  |  |  |
| --- | --- | --- |
|  | **A.** | oxygen gas |

|  |  |  |
| --- | --- | --- |
|  | **B.** | the Sun |

|  |  |  |
| --- | --- | --- |
|  | **C.** | bacteria |

|  |  |  |
| --- | --- | --- |
|  | **D.** | plant life |

#### Energy Flow in Ecosystems

**41.** Which type of organism generates oxygen and makes up the lowest trophic level in an energy pyramid?

|  |  |  |
| --- | --- | --- |
|  | **A.** | herbivores |

|  |  |  |
| --- | --- | --- |
|  | **B.** | omnivores |

|  |  |  |
| --- | --- | --- |
|  | **C.** | consumers |

|  |  |  |
| --- | --- | --- |
|  | **D.** | producers |

#### Organism Interactions & Population Dynamics

**42.** Almost no species ever reaches its biotic potential—the population size that the species could produce if all individuals survived and produced offspring.   
  
Anything that prevents the species from reaching its biotic potential is called a

|  |  |  |
| --- | --- | --- |
|  | **A.** | symbiote. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | limiting factor. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | producer. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | capacity limiter. |

#### Ecosystems & Biomes

**43.**

The taiga biome that covers most of Alaska is pictured above. Which of the following only lists biotic factors that can be found in this ecosystem?

|  |  |  |
| --- | --- | --- |
|  | **A.** | birch trees, short summers, lichen ground cover, and bears |

|  |  |  |
| --- | --- | --- |
|  | **B.** | moss, aspen trees, weasels, and raccoons |

|  |  |  |
| --- | --- | --- |
|  | **C.** | owls, poor soils, moss, and caribou |

|  |  |  |
| --- | --- | --- |
|  | **D.** | freezing temperatures, low precipitation, bogs, and acidic soil |

#### Ecosystems & Biomes

**44.** What is the name for the nonliving parts of an ecosystem?

|  |  |  |
| --- | --- | --- |
|  | **A.** | aerobic factors |

|  |  |  |
| --- | --- | --- |
|  | **B.** | abiotic factors |

|  |  |  |
| --- | --- | --- |
|  | **C.** | biotic factors |

|  |  |  |
| --- | --- | --- |
|  | **D.** | biome factors |

#### Organism Interactions & Population Dynamics

**45.** The graph below shows population data for two species.

What can be said about the relationship between species 1 and species 2?

|  |  |  |
| --- | --- | --- |
|  | **A.** | When the population of species 1 increases, the population of species 2 increases. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The populations of species 1 and species 2 stay the same over the time period shown. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | When the population of species 1 increases, the population of species 2 decreases. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The population of species 1 is not influenced by the population of species 2. |

#### Earth's Cycles

The carbon-oxygen cycle is shown below.

**46.** Which of the following is exclusively a man-made source of carbon dioxide?

|  |  |  |
| --- | --- | --- |
|  | **A.** | decomposition |

|  |  |  |
| --- | --- | --- |
|  | **B.** | combustion in cars |

|  |  |  |
| --- | --- | --- |
|  | **C.** | cellular respiration |

|  |  |  |
| --- | --- | --- |
|  | **D.** | erosion of limestone |

#### Environmental Change

**47.** How might an environment be affected if humans introduce a new type of plant to the environment?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The plant may compete with other plants for light. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The plant may become another food source for animals. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The plant may be poisonous and harmful to animals. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | all of these |

#### Energy Flow in Ecosystems

**48.** What does the following diagram illustrate?

|  |  |  |
| --- | --- | --- |
|  | **A.** | a food web |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a food pyramid |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a food chain |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a trophic level |

#### Earth's Cycles

**49.** The water cycle shows the continuous movement of Earth's water.

During which of the following water cycle processes does water move from living, organic matter to abiotic resources?

|  |  |  |
| --- | --- | --- |
|  | **A.** | vapor transport |

|  |  |  |
| --- | --- | --- |
|  | **B.** | precipitation |

|  |  |  |
| --- | --- | --- |
|  | **C.** | transpiration |

|  |  |  |
| --- | --- | --- |
|  | **D.** | condensation |

#### Earth's Cycles

**50.** The diagram above depicts the nitrogen cycle.  
  
According to this diagram, through which of the following processes are dead animals and plants converted into ammonia?

|  |  |  |
| --- | --- | --- |
|  | **A.** | denitrification |

|  |  |  |
| --- | --- | --- |
|  | **B.** | assimilation |

|  |  |  |
| --- | --- | --- |
|  | **C.** | ammonification |

|  |  |  |
| --- | --- | --- |
|  | **D.** | nitrogen-fixation |

#### Ecosystems & Biomes

**51.** Which choice below lists the biomes in order from lowest average temperatures to highest average temperatures?

|  |  |  |
| --- | --- | --- |
|  | **A.** | taiga, tropical rainforest, grasslands |

|  |  |  |
| --- | --- | --- |
|  | **B.** | taiga, temperate deciduous forest, savanna |

|  |  |  |
| --- | --- | --- |
|  | **C.** | tundra, savanna, temperate deciduous forest |

|  |  |  |
| --- | --- | --- |
|  | **D.** | tundra, grasslands, taiga |

#### Organism Interactions & Population Dynamics

**52.** All organisms must be able to obtain nutrients from their environment. Which of the following terms describes the process of one organism killing another organism in order to obtain nutrients?

|  |  |  |
| --- | --- | --- |
|  | **A.** | symbiosis |

|  |  |  |
| --- | --- | --- |
|  | **B.** | secondary trophism |

|  |  |  |
| --- | --- | --- |
|  | **C.** | coevolution |

|  |  |  |
| --- | --- | --- |
|  | **D.** | predation |

#### Ecosystems & Biomes

**53.** Technology Enhanced Questions are not available in Word format.

#### Environmental Change

**54.** Which of the following has had the greatest effect on ozone depletion?

|  |  |  |
| --- | --- | --- |
|  | **A.** | carbon monoxide (CO) |

|  |  |  |
| --- | --- | --- |
|  | **B.** | water vapor (H2O) |

|  |  |  |
| --- | --- | --- |
|  | **C.** | carbon dioxide (CO2) |

|  |  |  |
| --- | --- | --- |
|  | **D.** | chlorofluorocarbons (CFCs) |

#### Earth's Cycles

**55.** The diagram above depicts the nitrogen cycle.  
  
According to this diagram, which of the following contributes ammonia to the soil?

|  |  |  |
| --- | --- | --- |
|  | **A.** | atmospheric nitrogen |

|  |  |  |
| --- | --- | --- |
|  | **B.** | urine and dead plants and animals |

|  |  |  |
| --- | --- | --- |
|  | **C.** | dissolved nitrogen in rain |

|  |  |  |
| --- | --- | --- |
|  | **D.** | all of these |

#### Environmental Change

**56.** Increases in the sizes of human populations have caused a demand for more houses. When new subdivisions are built, trees are often cut down to make space for the new houses. Which of the following is an immediate impact of this deforestation?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The deforestation will increase atmospheric carbon dioxide levels. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | A reduction in tree populations will increase global temperatures. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Wood from the felled trees must be used immediately. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Animals that live in those areas must find new homes. |

#### Energy Flow in Ecosystems

**57.** The diagram below shows a food chain.

Grass → Rabbit → Weasel → Fox → Fungi

Which population would most likely increase if the weasel was removed from the food chain?

|  |  |  |
| --- | --- | --- |
|  | **A.** | grass |

|  |  |  |
| --- | --- | --- |
|  | **B.** | fox |

|  |  |  |
| --- | --- | --- |
|  | **C.** | rabbit |

|  |  |  |
| --- | --- | --- |
|  | **D.** | fungi |

#### Organism Interactions & Population Dynamics

**58.** Which of the following statements is true of all organisms in every environment?

|  |  |  |
| --- | --- | --- |
|  | **A.** | They are able to produce their own food. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | They must compete for essential resources. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | They must consume other organisms for energy. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | They avoid interaction as much as possible. |

#### Energy Flow in Ecosystems

**59.** What does the following diagram illustrate?

AlgaeMinnowsSalmonBear

|  |  |  |
| --- | --- | --- |
|  | **A.** | a trophic level |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a food chain |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a food pyramid |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a food web |

#### Energy Flow in Ecosystems

**60.** Which of the following living things would be found closest to the beginning of a food chain?

|  |  |  |
| --- | --- | --- |
|  | **A.** | mushroom |

|  |  |  |
| --- | --- | --- |
|  | **B.** | coyote |

|  |  |  |
| --- | --- | --- |
|  | **C.** | caterpillar |

|  |  |  |
| --- | --- | --- |
|  | **D.** | scorpion |

#### Energy Flow in Ecosystems

**61.** Food webs and food chains are two different ways that ecologists illustrate the interrelatedness of organisms in an ecosystem. What is the relationship between a food web and food chain?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Food chains are only used to illustrate organisms that consume only one kind of organism rather than multiple kinds of organisms, as illustrated in a food web. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Food webs illustrate multiple interrelated food chains. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Food chains illustrate only one trophic level of a food web. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Food webs illustrate all the organisms in an ecosystem dependent on one food chain. |

#### Organism Interactions & Population Dynamics

**62.** In January, a small number of Eastern Cottontail Rabbits were introduced into Red Forest. The population curve of the rabbits is shown above.   
  
According to the graph, the population of the rabbits increased rapidly at first, then leveled off in late March.   
  
Which of the following is the most likely explanation for why the population of Eastern Cottontail Rabbits did not continue to increase rapidly?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Increased rainfall in the spring caused fresh water supplies in Red Forest to become more plentiful. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | As the population of Eastern Cottontail Rabbits in Red Forest increased, food resources became scarce. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The number of predators of Eastern Cottontail Rabbits decreased. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Eastern Cottontail Rabbits in a distant forest ecosystem experienced severe disease. |

#### Organism Interactions & Population Dynamics

**63.** The organisms within an established ecosystem interact and form relationships with each other. This interdependence causes ecosystems to remain relatively stable for hundreds and thousands of years.  
  
For example, a population's size is often held in check by one or more environmental factors or another species. Which of the following would most likely negatively affect a population's size?

|  |  |
| --- | --- |
| I. | a drought |
| II. | a sudden change in climate |
| III. | an increase in food supply |
| IV. | immigration of a non-native species |

|  |  |  |
| --- | --- | --- |
|  | **A.** | III only |

|  |  |  |
| --- | --- | --- |
|  | **B.** | III and IV only |

|  |  |  |
| --- | --- | --- |
|  | **C.** | I, II, and IV only |

|  |  |  |
| --- | --- | --- |
|  | **D.** | I and II only |

#### Energy Flow in Ecosystems

**64.**

According to the food web shown, which group below lists only secondary consumers?

|  |  |  |
| --- | --- | --- |
|  | **A.** | fish, carnivorous zooplankton, birds |

|  |  |  |
| --- | --- | --- |
|  | **B.** | krill, leopard seal, smaller toothed whales |

|  |  |  |
| --- | --- | --- |
|  | **C.** | penguins, other seals, phytoplankton |

|  |  |  |
| --- | --- | --- |
|  | **D.** | elephant seal, fish, other herbivorous zooplankton |

#### Earth's Cycles

**65.** Peas, beans, and peanuts are all examples of legumes. Legumes are a specific type of plant which possess nodules on their roots, as shown below.

What is the purpose of these nodules?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The nodules contain bacteria which can convert atmospheric nitrogen into ammonia. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | The nodules contain chemicals which repel insects, like ants and beetles. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | The nodules contain pumps which allow water to enter the roots using reverse osmosis. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The nodules store plant sugars which are created during the process of photosynthesis. |

#### Energy Flow in Ecosystems

**66.** Technology Enhanced Questions are not available in Word format.

#### Earth's Cycles

**67.** When glucose molecules are broken down, energy is released, and carbon dioxide and water are produced. What is this process called?

|  |  |  |
| --- | --- | --- |
|  | **A.** | nitrogen fixation |

|  |  |  |
| --- | --- | --- |
|  | **B.** | glycolysis |

|  |  |  |
| --- | --- | --- |
|  | **C.** | photosynthesis |

|  |  |  |
| --- | --- | --- |
|  | **D.** | respiration |

#### Earth's Cycles

The carbon-oxygen cycle is shown below.

**68.** The process of photosynthesis

|  |  |  |
| --- | --- | --- |
|  | **A.** | results in the absorption of carbon dioxide from the atmosphere. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | generates glucose using oxygen and water as reactants. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | involves the conversion of sugar molecules into energy. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | generates carbon dioxide and releases it into the atmosphere. |

#### Ecosystems & Biomes

**69.** A wetland ecosystem is shown below.

Which of the following are abiotic factors of this ecosystem?

|  |  |
| --- | --- |
| I. | temperature |
| II. | aquatic plants |
| III. | water |
| IV. | sunlight |

|  |  |  |
| --- | --- | --- |
|  | **A.** | II and III only |

|  |  |  |
| --- | --- | --- |
|  | **B.** | I, III, and IV only |

|  |  |  |
| --- | --- | --- |
|  | **C.** | I, II, III, and IV |

|  |  |  |
| --- | --- | --- |
|  | **D.** | I and II only |

#### Organism Interactions & Population Dynamics

**70.** Theoretically, living organisms are capable of producing populations of infinite size. However, this never occurs because population sizes are limited by \_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
|  | **A.** | the availability of resources |

|  |  |  |
| --- | --- | --- |
|  | **B.** | organism interactions and behaviors |

|  |  |  |
| --- | --- | --- |
|  | **C.** | environmental conditions |

|  |  |  |
| --- | --- | --- |
|  | **D.** | all of these |

#### Organism Interactions & Population Dynamics

**71.** \_\_\_\_\_\_\_ can be defined as a long-term relationship between individuals of different biological species that typically results in a benefit for at least one of the individuals.

|  |  |  |
| --- | --- | --- |
|  | **A.** | Extinction |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Genetic drift |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Symbiosis |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Translocation |

#### Earth's Cycles

**72.** Which substance is removed from the atmosphere so that plants can carry out photosynthesis?

|  |  |  |
| --- | --- | --- |
|  | **A.** | water vapor |

|  |  |  |
| --- | --- | --- |
|  | **B.** | nitrogen |

|  |  |  |
| --- | --- | --- |
|  | **C.** | carbon dioxide |

|  |  |  |
| --- | --- | --- |
|  | **D.** | oxygen |

#### Organism Interactions & Population Dynamics

**73.** If sunlight were suddenly limited in an ecosystem, what might result?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Plants will die, but animal diversity in that ecosystem will increase. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Nothing will change. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Plants and animals will flourish because the ecosystem is not so hot. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | There will be less chemical energy available in that particular ecosystem. |

#### Organism Interactions & Population Dynamics

**74.** Which of the following is a biotic factor that limits the number of deer in an ecosystem?

|  |  |  |
| --- | --- | --- |
|  | **A.** | a predator |

|  |  |  |
| --- | --- | --- |
|  | **B.** | temperature |

|  |  |  |
| --- | --- | --- |
|  | **C.** | drought |

|  |  |  |
| --- | --- | --- |
|  | **D.** | flooding |

#### Energy Flow in Ecosystems

**75.** The diagram below shows a food web.

Which of the following is true about the food web?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Spiders gain energy directly from plants. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Snakes are a source of energy for toads. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Squirrels provide foxes and owls with energy. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Rabbits and mice provide each other with energy. |

#### Organism Interactions & Population Dynamics

**76.** Plants require nitrogen and phosphorous but cannot efficiently absorb these nutrients from the soil. Instead, they obtain the nutrients through fungi that live in their roots. In return, the fungi have access to carbohydrates manufactured by the plants. Without the fungi, plants would not be healthy and abundant, and the food supply of all of the organisms in the ecosystem would be in danger.  
  
This is an example of how \_\_\_\_\_\_\_ relationships maintain balance within an ecosystem.

|  |  |  |
| --- | --- | --- |
|  | **A.** | divergent |

|  |  |  |
| --- | --- | --- |
|  | **B.** | abiotic |

|  |  |  |
| --- | --- | --- |
|  | **C.** | symbiotic |

|  |  |  |
| --- | --- | --- |
|  | **D.** | competitive |

#### Ecosystems & Biomes

**77.** Which of the following shows the organizational level of a biome from the broadest category to the most specific category?

|  |  |  |
| --- | --- | --- |
|  | **A.** | biome → population → community → ecosystem → organism |

|  |  |  |
| --- | --- | --- |
|  | **B.** | biome → community → ecosystem → population → organism |

|  |  |  |
| --- | --- | --- |
|  | **C.** | biome → ecosystem → population → community → organism |

|  |  |  |
| --- | --- | --- |
|  | **D.** | biome → ecosystem → community → population → organism |

#### Earth's Cycles

**78.** Carbon is the basis of all life and is constantly being cycled through ecosystems. In which form is carbon passed along from plants to animals?

|  |  |  |
| --- | --- | --- |
|  | **A.** | carbohydrates |

|  |  |  |
| --- | --- | --- |
|  | **B.** | lipids |

|  |  |  |
| --- | --- | --- |
|  | **C.** | proteins |

|  |  |  |
| --- | --- | --- |
|  | **D.** | all of these |

#### Ecosystems & Biomes

**79.** All of the living organisms in a forest plus their environment is an example of

|  |  |  |
| --- | --- | --- |
|  | **A.** | a community. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a biome. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a population. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | an ecosystem. |

#### Environmental Change

**80.** Acid rain is formed when nitrogen oxides and sulfur dioxides are released into the atmosphere. Acid rain contributes to erosion. Which of the following is a natural cause of acid rain?

|  |  |  |
| --- | --- | --- |
|  | **A.** | car emissions |

|  |  |  |
| --- | --- | --- |
|  | **B.** | use of natural gas |

|  |  |  |
| --- | --- | --- |
|  | **C.** | burning coal |

|  |  |  |
| --- | --- | --- |
|  | **D.** | volcanic eruptions |

#### Ecosystems & Biomes

**81.** Succulent plants, such as cacti, are most often found in which terrestrial biome?

|  |  |  |
| --- | --- | --- |
|  | **A.** | tundra |

|  |  |  |
| --- | --- | --- |
|  | **B.** | grassland |

|  |  |  |
| --- | --- | --- |
|  | **C.** | rainforest |

|  |  |  |
| --- | --- | --- |
|  | **D.** | desert |

#### Earth's Cycles

**82.** Plants transfer water in the water cycle

|  |  |  |
| --- | --- | --- |
|  | **A.** | through assimilation. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | through fixation. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | through transpiration. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | through ammonification. |

#### Ecosystems & Biomes

**83.** Which species list includes animals that would most likely be found in a taiga biome?

|  |  |  |
| --- | --- | --- |
|  | **A.** | camels, rattlesnakes, and cacti |

|  |  |  |
| --- | --- | --- |
|  | **B.** | parrots, frogs, and bamboo trees |

|  |  |  |
| --- | --- | --- |
|  | **C.** | zebra, cheetahs, and grasses |

|  |  |  |
| --- | --- | --- |
|  | **D.** | lynxes, moose, and pine trees |

#### Ecosystems & Biomes

**84.** A pod of dolphins hunting and feeding on a school of fish is an example of

|  |  |  |
| --- | --- | --- |
|  | **A.** | a population interaction. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a community interaction. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | an ecosystem interaction. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a biome interaction. |

#### Energy Flow in Ecosystems

**85.** Food chains show how living organisms obtain their food, while food webs show how multiple food chains are interrelated.  
  
Which of the following is a true statement regarding food webs?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Matter and energy are not conserved as they pass through a food web. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Matter and energy are conserved as they pass through a food web. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Ninety percent of the energy that is available at one trophic level is transferred to the next level. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Ninety percent of the matter that is available at one trophic level is transferred to the next level. |

#### Energy Flow in Ecosystems

**86.** Examine the energy pyramid below. Why is the first block containing the plants the widest block?

|  |  |  |
| --- | --- | --- |
|  | **A.** | This block represents all the producers and herbivores in the ecosystem. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | This block represents the most complex organisms in the pyramid. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | This block represents ten times the number of organisms of the next block. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | This block represents the trophic level with the most stored energy. |

#### Earth's Cycles

**87.** Technology Enhanced Questions are not available in Word format.

#### Ecosystems & Biomes

**88.** A desert with a hot, dry climate is an example of

|  |  |  |
| --- | --- | --- |
|  | **A.** | a biome. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | an ecosystem. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a population. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | a community. |

#### Environmental Change

**89.** Many common products, such as wooden furniture, paper, and books, are made from trees. Which of the following is a likely consequence of humans cutting down a forest in order to make use of the natural resources there?

|  |  |  |
| --- | --- | --- |
|  | **A.** | the destruction of habitats |

|  |  |  |
| --- | --- | --- |
|  | **B.** | the proliferation of acid rain |

|  |  |  |
| --- | --- | --- |
|  | **C.** | the decrease of chemical runoff into the oceans |

|  |  |  |
| --- | --- | --- |
|  | **D.** | the increase of light pollution in cities |

#### Organism Interactions & Population Dynamics

**90.** An ecosystem experiences a rapid increase in the algae population as a result of lawn fertilizer entering the system through storm drains. The food chain below is part of the ecosystem.

AlgaeMinnowsSalmonBear

As the algae and other plants begin to die, they cause the bacterial population to explode. The bacteria exhaust the supply of dissolved oxygen needed by animals living in the water. What will happen to the minnow population?

|  |  |  |
| --- | --- | --- |
|  | **A.** | It will first decline, then grow. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | It will be unaffected by the change. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | It will soon start to grow. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | It will soon start to decline. |

#### Organism Interactions & Population Dynamics

**91.** White-tailed deer are considered to be an overpopulated species in the central United States. Which of these events probably contributed the most to white-tailed deer exceeding their carrying capacity?

|  |  |  |
| --- | --- | --- |
|  | **A.** | the occurrence of a genetic mutation that prevented breeding |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a large decrease in predators, such as wolves |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a large increase in available grassland |

|  |  |  |
| --- | --- | --- |
|  | **D.** | the water supply in the habitat remained steady |

#### Organism Interactions & Population Dynamics

**92.** Which of the following is an example of predation?

|  |  |  |
| --- | --- | --- |
|  | **A.** | a tapeworm lives in the intestine of a cat and absorbs nutrients for energy |

|  |  |  |
| --- | --- | --- |
|  | **B.** | a white-tailed deer consumes a plant in the forest for energy |

|  |  |  |
| --- | --- | --- |
|  | **C.** | a tick attaches to the flesh of a dog and consumes its blood for energy |

|  |  |  |
| --- | --- | --- |
|  | **D.** | an owl hunts, catches, and consumes a field mouse for energy |

#### Energy Flow in Ecosystems

**93.** The energy pyramid below shows a possible amount of energy, in kilocalories, available in the organisms at each trophic level in an ecosystem.

According to the law of conservation of energy, energy can neither be created nor destroyed. If this is true, why is there less energy in the top of the energy pyramid than there is in the bottom of the energy pyramid?

|  |  |  |
| --- | --- | --- |
|  | **A.** | The law of conservation of energy does not apply to ecosystems. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Organisms in the top of the energy pyramid use up energy the fastest. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Energy is lost between each trophic level as heat. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | The extra energy in the bottom is slower to reach the top. |

#### Environmental Change

**94.** Which of the following statements best explains the impact deforestation has had on the water cycle?

|  |  |  |
| --- | --- | --- |
|  | **A.** | Increased evaporation has increased water pollutants. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | Increased surface runoff has increased water pollutants. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | Decreased surface runoff has decreased water pollutants. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | Decreased evaporation has decreased water pollutants. |

#### Ecosystems & Biomes

**95.** Which choice below lists the biomes in order from lowest precipitation amounts to highest precipitation amounts?

|  |  |  |
| --- | --- | --- |
|  | **A.** | desert, grasslands, temperate deciduous forest, tropical rainforest |

|  |  |  |
| --- | --- | --- |
|  | **B.** | desert, temperate deciduous forest, grasslands, tropical rainforest |

|  |  |  |
| --- | --- | --- |
|  | **C.** | grasslands, desert, temperate deciduous forest, tropical rainforest |

|  |  |  |
| --- | --- | --- |
|  | **D.** | grasslands, desert, tropical rainforest, temperate deciduous forest |

#### Ecosystems & Biomes

**96.** Savanna, tundra, grasslands, and temperate forest are examples of \_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
|  | **A.** | populations |

|  |  |  |
| --- | --- | --- |
|  | **B.** | communities |

|  |  |  |
| --- | --- | --- |
|  | **C.** | biospheres |

|  |  |  |
| --- | --- | --- |
|  | **D.** | biomes |

#### Earth's Cycles

**97.** Technology Enhanced Questions are not available in Word format.

#### Earth's Cycles

**98.** Technology Enhanced Questions are not available in Word format.

#### Earth's Cycles

**99.** The diagram above depicts the nitrogen cycle.  
  
According to the diagram, how is nitrogen returned to the soil from animals?

|  |  |  |
| --- | --- | --- |
|  | **A.** | fossil fuels and denitrification |

|  |  |  |
| --- | --- | --- |
|  | **B.** | assimilation and ammonification |

|  |  |  |
| --- | --- | --- |
|  | **C.** | urine and decomposition following death |

|  |  |  |
| --- | --- | --- |
|  | **D.** | fertilizer and nitrogen-fixing bacteria |

#### Energy Flow in Ecosystems

**100.**

The trophic levels of the energy pyramid above show that

|  |  |  |
| --- | --- | --- |
|  | **A.** | energy is not transferred between organisms in an ecosystem. |

|  |  |  |
| --- | --- | --- |
|  | **B.** | there is a great amount of energy gained as it travels up the energy pyramid. |

|  |  |  |
| --- | --- | --- |
|  | **C.** | the same amount of energy is available at every level of the energy pyramid. |

|  |  |  |
| --- | --- | --- |
|  | **D.** | there is a great amount of energy lost as it travels up the energy pyramid. |

# Answers

1. A   
2. A   
3. D   
4. B   
5. A   
6. C   
7. A   
8. A   
9. A   
10. C   
11. D   
12. B   
13. D   
14. B   
15. B   
16. B   
17. B   
18. C   
19. B   
20. D   
21. C   
22. B   
23. --   
24. A   
25. B   
26. --   
27. D   
28. B   
29. D   
30. B   
31. D   
32. D   
33. D   
34. C   
35. --   
36. D   
37. C   
38. C   
39. C   
40. B   
41. D   
42. B   
43. B   
44. B   
45. C   
46. B   
47. D   
48. A   
49. C   
50. C   
51. B   
52. D   
53. --   
54. D   
55. D   
56. D   
57. C   
58. B   
59. B   
60. C   
61. B   
62. B   
63. C   
64. A   
65. A   
66. --   
67. D   
68. A   
69. B   
70. D   
71. C   
72. C   
73. D   
74. A   
75. C   
76. C   
77. D   
78. D   
79. D   
80. D   
81. D   
82. C   
83. D   
84. B   
85. B   
86. D   
87. --   
88. A   
89. A   
90. D   
91. B   
92. D   
93. C   
94. B   
95. A   
96. D   
97. --   
98. --   
99. C   
100. D

# Explanations

1. **Global warming** refers to an increase in the Earth's average temperature. Atmospheric levels of carbon dioxide have increased due largely to the burning of fossil fuels. The higher levels enhance the greenhouse effect, which causes global warming.

2. Species can become extinct for a variety of reasons:

* climate change (e.g., the end of an ice age)
* catastrophic events (e.g., a large meteorite impact)
* biological factors (e.g., competition for food)
* human impact (e.g., loss of habitat)

3. A limiting factor is a resource that limits the growth of a population. The limiting factor for the population described in the question is space. This means that the carrying capacity in the ecosystem for this population is determined by how much space is available, no matter how much food, water, or shelter the population has access to.  
  
**The species will** most likely **go extinct** if human construction continues to lead to the destruction of its habitat.

4. Zebra mussels have invaded new ecosystems halfway around the world, and they have the potential to severely disrupt these new ecosystems.  
  
In addition to their negative impacts, they also have the positive impact of filtering the water. However, even though **non-native species can have both positive and negative effects**, the positive effects do not outweigh the numerous negative effects of the invading species.

5. Deforestation increases the amount of water runoff because plant life is not present to absorb water. The increased water runoff contributes to **erosion**.

6. As human populations grow, they often modify ecosystems. For example, increases in human population sizes have increased the demand for energy. To meet these demands, some countries use nuclear energy to generate electricity.  
  
There are advantages to using nuclear energy, including

* nuclear fuel is inexpensive
* there is less solid waste
* nuclear fuel is easy to transport because it is compact
* it does not generate greenhouse gases or air pollution

One disadvantage of using nuclear energy, however, is that is can **increase thermal pollution** due to the abundant heat that is produced during the nuclear reactions. If excess heat is released into local bodies of water, it may detrimentally affect fish and other wildlife, whose body enzymes only function within certain temperature ranges.

7. A *community* is made up of different populations that interact with each other. Bees, wasps, and flowers together make up a community.  
  
A population is a group of organisms from the same species in the same area. A school of fish is an example of a population.  
  
An ecosystem consists of all the living organisms in an area, and their physical environment. A nest of mockingbirds, some bullfrogs, a pond, and a sandy shore together make up an ecosystem.   
  
A biome is a distinct climate zone. A tropical rainforest is an example of a biome.

8. A scarcity of food sources is a limiting factor for a population. Typically, this causes the **population's size to decrease**.

9. The only *unlikely* result proposed for Lake Pueblo's ecosystem is that there will be no effect.   
  
When an invasive organism moves into an established ecosystem, it must compete directly with some of the existing organisms for food. As a result, populations of the existing organism will decline, as will populations of consumers on the next levels of the ecosystem's food web. In some cases, new animals immigrate into the ecosystem if they are able to use the invading species as food, or existing animals develop new adaptations.

10. **Tropical rainforests** are abundant with animal and plant life, thanks to their warm, moist climates. The vegetation is so thick that the tops of the trees form a *canopy* above the forest floor. Very little sunlight can pass through the canopy.

11. Multicellular organisms develop resistances to pathogens they have been exposed to. A new pathogen may rapidly infect a population, **disrupting the ecosystem by greatly reducing the population of a few species**. The affected species occupy particular niches in the ecosystem. With those niches unfilled, the entire ecosystem will be unbalanced as consumers of those organisms must look elsewhere for food, and the organisms the affected species consume may over-reproduce, making themselves susceptible to starvation and disease. A particular microorganism will usually be most compatible with one particular species, and it may not be able to infect other species at all.

12. **Decomposers**, such as worms, bacteria, and fungi, are an important part of the carbon cycle, since they break down dead plant and animal matter. In doing so, the carbon contained in the dead plant and animal matter is returned to the atmosphere as carbon dioxide.

13. Models are often used to explain scientific knowledge or experimental results. Objects, mathematical relationships, plans, schemes, and computer simulations are all examples of scientific models.  
  
Based on the carbon cycle model, it can be determined that **both plants and animals release carbon dioxide into the atmosphere during cellular respiration**. Plants also take in carbon dioxide during photosynthesis, but in order to use the food produced during photosynthesis, plants perform cellular respiration.

14. Although plants and other producers make up the first trophic level of all food webs or food chains, the ultimate source of energy for all ecosystems is the **Sun**. A continuous input of energy from the Sun drives many natural processes found in all ecosystems such as photosynthesis and the water cycle.

15. Each level in a food chain provides energy for the level above it. However, the organisms at each level also **use some of the energy** to survive. This means that only about ten percent of the energy produced at each level is available to the level above it.

16. A population is a group of organisms from the same species in the same area. A school of fish is an example of a population.  
  
A *community* is made up of different populations that interact with each other. Bees, wasps, and flowers together make up a community.  
  
An ecosystem consists of all the living organisms in an area, and their physical environment. A nest of mockingbirds, some bullfrogs, a pond, and a sandy shore together make up an ecosystem.   
  
A biome is a distinct climate zone. A tropical rainforest is an example of a biome.

17. More than 99% of the Earth's oxygen is bound in minerals, which are found in the crust and mantle. However, atmospheric oxygen is not being depleted. The levels are kept relatively constant through the interrelated processes of photosynthesis and cellular respiration.  
  
Cyanobacteria, algae, and land-based plants perform photosynthesis. As starting material, they use the carbon dioxide that is breathed out by plants, animals, and aerobic bacteria. Photosynthesis produces glucose that plants—and the animals that eat them—can use to generate cellular energy.  
  
Photosynthesis also produces oxygen as a waste product. The waste oxygen enters the atmosphere, where plants, animals, and aerobic bacteria use it as starting material for performing cellular respiration.

18. Climate change refers to how the Earth's climate changes over time. The **burning of fossil fuels** has released greenhouse gases into the atmosphere. These have caused the Earth's overall temperature to rise.

19. An ecosystem includes **all the living organisms in an area and their physical surroundings**, or environment.

20. **Competition** takes place when two or more organisms or species within an ecosystem seek the same resource. In the case of the American bullfrog, the invasive species is reducing the amount of food resources available to native frogs in the western United States. This causes competition between American bullfrogs and the native species because the growth of both populations is limited by the amount of food that is available to them.

21. The ozone layer absorbs ultraviolet light. Ozone depletion has decreased the amount of ultraviolet light absorbed. This **increases surface levels of ultraviolet light**.

22. According to the diagram of the Antarctic food web, krill are the only organisms that eat both the energy producers (phytoplankton) and an organism that also eats the phytoplankton (other herbivorous zooplankton). This makes **krill** both primary consumers and secondary consumers.

23. --

24. Biotic factors are the living components of an ecosystem. They include all types of plants and animals. Lizards, insects, and cacti are all living, or biotic, factors common in the desert biome.  
  
Abiotic factors are nonliving components of an ecosystem. In a desert biome, sand, rocks, heat, and sunlight are abiotic factors.

25. Only **I and II** are correct.  
  
Planting trees to help replace those that were previously cut down is a way that humans can help the environment.  
  
The growing population and its use of resources is leading to the destruction of more of the environment. It is important to come up with ways to help the environment rather than harm it.

26. --

27. Acid rain can harm plants by eroding a plant's leaves. The chlorophyll contained in the leaves of plants is needed to absorb sunlight energy and use it to produce food. Without healthy leaves, the ability to absorb sunlight energy would be limited.

28. Abiotic factors make up the *nonliving* portion of an ecosystem.  
  
In an ocean ecosystem, such as the one pictured, **ocean currents** and **sand** are abiotic factors. Plankton and fish are living and are therefore biotic.

29. When a non-native species is introduced to a new ecosystem, it will often **have fewer predators** than in the ecosystem where it originally evolved.  
  
Though the gypsy moth is prey for small mammals and damaged by some viral infections found in the United States, it has fewer predators overall than native species.   
  
The most severe outbreaks of gypsy moth larvae happen in urban and developed areas where there are fewer small mammals, such as mice, to eat them.

30.

During the water cycle, surface runoff (step 1) flows into rivers, lakes, and streams. Sunlight causes this water to undergo evaporation (step 2). Water vapor can also be released from plants through transpiration. The water vapor remains in the atmosphere until it undergoes condensation (step 3) and returns to the ground in the form of **precipitation** (step 4).

Energy from the Sun drives the water cycle. Without the Sun's heat, water would not be able to evaporate, which means that the other processes also would not occur.

31. After the eruption of Krakatau, global temperatures fell by about 1.2°C for one year. This was caused by the increased amount of particulates and volcanic gases in the stratosphere.   
  
The particulates and volcanic gases caused more cirrus clouds to form than usual. The clouds reflected some of the solar radiation that usually reaches Earth's surface, and this led to cooler surface temperatures.

32. **The biosphere** is any region on Earth where life can exist, including water, land, and air. It is the broadest category of ecological organization. Every ecosystem in every biome on Earth is part of the biosphere.

33. More often than not, alterations in ecosystems occur as a result of some human activity. Some of these alterations (e.g., deforestation, pollution) destroy habitats and may threaten global stability. Furthermore, if attention is not paid to the factors which lead to these alterations, ecosystems may be irreversibly affected.

34. There are many negative consequences that occur when a population exceeds its carrying capacity.   
  
For example, the overabundance of white-tailed deer causes them to be seen more frequently in urban areas. They forage for food in gardens and dart across roadways, which causes more car accidents.  
  
Also, due to overgrazing, the nutrition of the deer population has declined. So, the deer are **less healthy and more prone to diseases**. These diseases may be passed on to livestock and other animals.

35. --

36. The chemical elements that make up the molecules of living things (e.g., carbon, hydrogen, nitrogen, oxygen) pass through food webs and are combined and recombined in different ways. At each link in an ecosystem, **some energy** (approximately 10%) **is stored in newly made structures**, although most of the energy (approximately 90%) is dissipated into the environment as heat.

37. Fertilizers add nutrients to soil, so crop growth is encouraged and land can be used for longer periods of time.  
  
However, one negative environmental impact of fertilizer usage is that **run-off from fertilized land increases nitrogen levels in ecosystems and encourages algal growth**.

38. Plants can only use nitrogen in certain forms, such as nitrates (NO3-). Plants cannot directly use atmospheric nitrogen (N2). Thus, atmospheric nitrogen must undergo a process called *nitrogen-fixation* in order to be changed into a form that is usable to plants.  
  
**Bacteria** found in soil and in the roots of plants are important to the nitrogen cycle because they are primarily responsible for nitrogen-fixation.

39. The energy in a food chain initially enters through the green plants at the beginning of the chain. The plants make food from the energy they absorb **from the Sun**.

40. Food chains describe the eating relationships and energy flow between species within an ecosystem. The ultimate source of energy for almost all ecosystems on Earth is **the Sun**.  
  
Producers, such as plants, receive energy from the Sun and make their own food (i.e., glucose sugar) through the process of photosynthesis. Producers are at the beginning of food chains because all of the other organisms in food chains depend on the food energy that they make.

41. **Producers** are plants or other photosynthetic organisms that generate oxygen as a byproduct of photosynthesis.  
  
Producers make up the lowest trophic level in the energy pyramid for any ecosystem because they make food for themselves and the animals that consume them. There are more organisms in this trophic level than in any other.

42. Generally, the population size of species in an ecosystem is kept in check by biotic and abiotic elements called **limiting factors**.  
  
Biotic limiting factors could be predators, disease, or the absence of an adequate food supply. Abiotic (nonliving) limiting factors include inhospitable temperatures, a limited supply of breathable gas (oxygen for animals and carbon dioxide for plants), and a limited water supply.

43. Biotic factors are the living components of an ecosystem. They include all types of plants and animals.  
  
**Moss, aspen trees, weasels, and raccoons** are all living, or biotic, factors common in the taiga biome.

44. Biotic factors, such as trees, are the living parts of an ecosystem. Predators, food sources, and competitors are other examples of biotic factors.  
  
Abiotic factors are not, and have never been, alive. Air, temperature, moisture, salinity, and pH are all abiotic factors.  
  
All organisms within an ecosystem are influenced by the combination of the biotic and abiotic components in their environments.

45. The graph shows that as the population of species 1 increases, the population of species 2 decreases. This might imply a predator-prey relationship between the two species.  
  
The other possibility is that the two species are competing for food or other resources as they would if they were trying to occupy the same niche.

46. According to the diagram, sources of carbon dioxide include: cellular respiration, decomposition, combustion, erosion, and burning trees.  
  
Of these sources, only combustion and burning trees (in fireplaces, to clear brush, etc.) can be man-made sources of carbon dioxide.  
  
Natural sources of carbon dioxide include cellular respiration, decomposition, erosion, and burning trees (i.e., natural forest fires).

47. When humans introduce non-native species to an area, there are many possible effects.  
  
If a plant were introduced to an environment,

* **the plant may compete with other plants for light.**
* **the plant may be poisonous and harmful to animals.**
* **the plant may become another food source for animals.**

48. In most ecosystems, energy does not follow simple straight paths because individual animals often feed at several trophic levels. This creates a complicated, interconnected group of food chains called a **food web**.

49. During the water cycle, water that evaporates from Earth's surface is transported throughout the atmosphere. At cooler temperatures, the water vapor in the atmosphere condenses into precipitation. The precipitation is then absorbed by the soil, or it runs off into bodies of water. Then, the water evaporates to begin the cycle again.  
  
**Transpiration** is a process in the water cycle that specifically involves the evaporation of water from plants. Since plants are living and the atmosphere is nonliving, transpiration is the process in which water moves from living, organic matter to abiotic resources.

50. Nitrates are taken up by plants through the process of **assimilation**. Dead animals and plants are converted into ammonia through the process of **ammonification**. Nitrates are returned to the atmosphere through the process of **denitrification**.

51. The tundra is the coldest biome, followed by the taiga. The tropical rainforest and savanna are the warmest biomes.   
  
Temperate deciduous forests and grasslands tend to have middle-range temperatures. These are the most common biomes of the United States.  
  
Deserts are in a unique category because they can have wide fluctuations in temperature, from extremely hot to extremely cold.

52. **Predation** is the act of one organism killing another for food. Common examples of predation include a fox eating a chicken and a cat eating a mouse.

53. --

54. **Chlorofluorocarbons (CFCs)** released into the atmosphere have had the greatest impact on ozone depletion. CFCs have been released into the atmosphere via their use in fire extinguishers, aerosol cans, and as refrigerants.

55. Ammonia is contributed to the soil from a variety of sources, including

* atmospheric nitrogen,
* dissolved nitrogen in rain, and
* urine and dead plants and animals.

56. As human populations grow, they often modify ecosystems. For example, when land is cleared to build new houses, deforestation occurs. The loss of trees could increase atmospheric carbon dioxide levels and global warming. However, these effects are not seen as immediately as others, including **the loss of animal habitats** and soil erosion.

57. The number of organisms at each trophic level is dependent upon the number of organisms feeding on it. The **rabbit** numbers are limited because they are a food source for the weasel. If the weasel was removed from the food chain, the rabbit population would most likely increase.

58. In all environments, **organisms must compete for essential resources** because the quantities of these resources are limited. Examples of essential resources include food, water, sunlight, and shelter.  
  
Also, every population must interact with and is linked, directly or indirectly, with many others. For example, some organisms are able to produce their own food, while others must consume other organisms in order to acquire energy.

59. The path of energy through the trophic levels of an ecosystem is called a **food chain**. All food chains begin with a producer.

60. Primary producers (plants) typically occur at the beginning of all food chains. The next organisms are the primary consumers, or livings things that consume plants. A **caterpillar** is an example of a primary consumer. A scorpion is a secondary consumer, which feeds on other consumers. Mushrooms are decomposers; these organisms feed on dead plant and animal material throughout the food chain.

61. A food chain is a simplified version of how energy flows through an ecosystem. While a food chain does show the energy-flow relationships between one kind of organism on each trophic level, a food web will illustrate many different organisms on the same trophic level as well as the energy-flow relationship within and between each of these levels. In essence, a food web is a depiction of many different food chains.

62. *Carrying capacity* refers to the maximum number of members of a population that a particular environment can sustain for survival. In any ecosystem, the basic resources that organisms need for survival are always in limited supply. Examples include food, water, sunlight, oxygen, and shelter.  
  
As a growing population reaches the limits of the available resources in an environment, its size levels off to "match" the amount of resources available. In doing so, the population reaches its carrying capacity.   
  
Of the answer choices given, the most likely cause for the Eastern Cottontail Rabbits to have reached their carrying capacity is limitations in food supply.   
  
Since carrying capacity is defined for a specific area, disease to Eastern Cottontail Rabbits in another ecosystem would not affect the carrying capacity of Eastern Cottontail Rabbits in Red Forest. Furthermore, increased rainfall or a decrease in predators would encourage rapid population growth rather than discourage it.

63. A population's size is often affected by changes in the numbers and types of species present in an ecosystem as well as environmental changes.  
  
Examples of changes which may negatively affect a population's size include droughts (water shortages) and other catastrophic events, like tornadoes, wildfires, floods, and volcanic eruptions. The immigration of non-native species of organisms may also negatively affect a population's size because it causes food webs to be disrupted.  
  
Examples of changes which may positively affect a population's size include an increase in food supply, which, in turn, may result from the emigration of a species and/or good weather.

64. Secondary consumers are the organisms that eat the primary consumers. Primary consumers eat the producers (phytoplankton). The only choice that lists *only* secondary consumers is **fish, carnivorous zooplankton, and birds**.

65. Plants need nitrogen for a variety of structural and metabolic reasons. However, plants are unable to use nitrogen directly from the atmosphere. Instead, they must first convert the nitrogen into other compounds, such as ammonia.  
  
The nodules found on the roots of legumes **contain bacteria which can convert atmospheric nitrogen into ammonia**. This conversion process is known as *nitrogen-fixation*.

66. --

67. **Respiration** is the process through which organisms break down glucose molecules. Respiration produces carbon dioxide and water and releases energy.

68. In the process of cellular respiration, glucose and oxygen molecules are broken down to create energy in the form of ATP. The by-products of this reaction are carbon dioxide and water.  
  
The carbon dioxide released into the atmosphere during the process of cellular respiration is absorbed from the atmosphere by producers and used to perform photosynthesis. During photosynthesis, producers create new molecules of glucose and oxygen.

69. Abiotic factors make up the nonliving portion of an ecosystem.  
  
**Temperature, sunlight, and water** are examples of **abiotic** factors of an ecosystem. Aquatic plants are biotic, or living, components of a wetland ecosystem.

70. Even though living organisms are capable of producing populations of infinite size, they are ultimately limited by

* organism interactions and behaviors (e.g., cooperation, competition, etc.)
* the availability of resources, such as food, water, and shelter
* environmental conditions, which, in turn, may be affected by natural causes (e.g., tornado, fire, flood) or human causes (e.g., pollution, deforestation)

71. **Symbiosis** is a long-term relationship between individuals of different biological species that typically results in a benefit for at least one of the individuals. The other individual can either receive a benefit, be harmed, or not be affected in any way.

72. When photosynthesis occurs, water and **carbon dioxide** are combined to produce glucose. The carbon dioxide is removed from the atmosphere, and the carbon is used to produce glucose.

73. Plants use energy from the sun and, through photosynthesis, convert solar energy into chemical energy that can be used by other organisms. Logically, there will be less chemical energy available if plants do not have enough sunlight to perform photosynthesis.

74. Drought, flooding, and temperatures are *nonliving* (abiotic) weather patterns that could result in a smaller deer population.  
  
**A predator** is a biotic (living) factor that limits the number of deer in an ecosystem.

75. A food web shows the connections between the living things in an environment. An arrow from one living thing to another indicates that the living thing is a source of energy for the living thing that the arrow is pointing to. In this case, the food web shows that **squirrels are a source of energy for both foxes and owls**.

76. **Symbiotic** relationships are essential for maintaining balance in an ecosystem.  
  
Over time, species have developed beneficial or cooperative relationships. As a result, other species that can take advantage of those relationships have developed. For instance, all animals take advantage of the beneficial relationship between plants and the fungi that live in plant roots.

77. It is helpful for scientists to organize the biosphere into levels and categories.   
  
The organizational level of a biome from the broadest category to the most specific category is:

**biome → ecosystem → community → population → organism**

A biome is a region of distinct climate, such as a desert or rainforest. A biome is made up of separate (but similar) ecosystems.   
  
An ecosystem includes all the living organisms in an area and their physical environment. An ecosystem is made up of communities.   
  
A community is made up of different, interacting populations.   
  
A population is a group of organisms of the same species living in a particular place.

78. During photosynthesis, plants transform light energy into chemical energy. The chemical energy is stored in the bonds of glucose molecules—a simple carbohydrate. Plants can break down the glucose molecules for energy needed for cellular processes.  
  
Plants can also use the glucose made during photosynthesis to create other biological molecules such as lipids, proteins, and nucleic acids. When animals consume plants, they take in **all of these** substances.

79. An *ecosystem* consists of all the living organisms in an area and their physical environment. All of the living organisms in a forest plus their physical environment is an example of **an ecosystem**.  
  
A *population* is a group of organisms from the same species in the same area. A herd of cattle is an example of a population.  
  
A *community* is made up of different populations that interact with each other. A pod of dolphins hunting and feeding on a school of fish is an example of a community interaction.  
  
A *biome* is a distinct climate zone. A desert with a hot, dry climate is an example of a biome.

80. Acid rain is formed when nitrogen oxides and sulfur dioxides are released into the atmosphere and become part of the water droplets of clouds. Three ways that human activity contributes to acid rain is by burning coal, by the use of natural gas, and by car emissions.  
  
A natural cause of acid rain is through **volcanic eruptions**.

81. Succulent plants, such as cacti, are adapted to be able to withstand very dry conditions. Therefore, they are most often found in **desert** biomes, which are very hot and dry.

82. **Transpiration** is the loss of water vapor from a plant through its stomata.

83. The taiga biome experiences long, cold winters; short, warm summers; and low precipitation. It is characterized by coniferous forests. Species commonly found in the taiga would most likely include **lynxes, moose, and pine trees**.

84. A *community* is made up of different populations that interact with each other. A pod of dolphins hunting and feeding on a school of fish is an example of **a community interaction**.  
  
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85. According to the laws of conservation of matter and energy, neither matter nor energy can be created or destroyed. They can only change forms.  
  
Although it is true that only 10% of the energy that is available at one trophic level is transferred to the next level, the rest changes into heat energy, so the total amount of **energy is still conserved**. However, the heat energy is considered "lost" because it is not useful to the system.  
  
Likewise, even though only a portion of matter is transferred from trophic level to trophic level, the remaining "waste" is recycled through processes such as the carbon or nitrogen cycles. Thus, the total amount of **matter is also conserved**.

86. The width of a energy pyramid's blocks is determined by the amount of energy stored in the organisms at that trophic level. Because the energy stored by the organisms at each trophic level is about one-tenth of the energy stored by the next level, the lowest level is the widest and the highest level is the smallest.

87. --

88. A *biome* is a distinct climate zone. A desert with a hot, dry climate is an example of **a biome**.  
  
A *population* is a group of organisms from the same species in the same area. A herd of cattle is an example of a population.  
  
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89. A forest contains many different habitats needed by various organisms. Without an appropriate habitat, the organisms are forced to migrate or will die. When forests are cut down, **some of these habitats are destroyed**.

90. An algal bloom resulting from an increase in available nutrients is the first step in a cycle of events. First, algae growth increases, which may result in the growth of populations that feed on algae directly. Therefore, an increase in algae growth would cause a rise in minnow population.  
  
The next phase of an algal bloom is that other types of plants that grow more slowly than the algae cannot compete for oxygen and nutrients, and therefore begin to die. Bacteria populations, normally present in the water, grow to exploit the new food source—decaying plant material.  
  
The large bacterial colonies use more oxygen, and the oxygen available to fish and insects decreases. As a result, populations of these organisms—such as the minnows in the food chain shown—begin to shrink.  
  
Because algae bloom cycles proceed quickly, the increase in population experienced by organisms that feed directly on the algae (minnows in our example) may not have a chance to move up to the next level in the food chain. Therefore, salmon populations may not experience an increase at all, but will begin to decline once the oxygen levels drop sufficiently.

91. White-tailed deer have exceeded their carrying capacity by exceeding the limits of space and food provided by their habitat. A population that exceeds its carrying capacity is considered to be *overpopulated*.  
  
These are a few of the possible events that can contribute to a population becoming overpopulated.

* a decrease in space in the habitat due to human development or natural disasters
* **a decrease in predators in the habitat**
* a decrease in the food or water in the habitat due to natural disaster

92. The biological interaction in which one organism (the predator) hunts, kills, and eats another organism (the prey) for energy is known as predation.  
  
Predators use their prey as a source of food. Predation is different from parasitism because the prey is killed immediately for consumption. During parasitism, the host is kept alive for a long period of time so that the parasite can continue to receive nutrients from the host.  
  
An example of predation is **an owl hunting, catching, and consuming a field mouse for energy**.

93. The law of conservation of energy is universal. Energy cannot be created nor destroyed. There is less energy available in the top of the energy pyramid than there is in the bottom because organisms all along the energy pyramid are using the energy, and some of the **energy is lost between each trophic level as heat**. The heat energy is dispersed into the surrounding environment.

94. Deforestation **increases the amount of surface runoff** because plants are not present to absorb the water. This **increases the amount of water pollutants** being transferred to rivers, lakes, and oceans.

95. Forests receive large amounts of precipitation needed to grow thick vegetation. As you might expect, rainforests receive more precipitation than any other biome. Grasslands do not receive enough precipitation for trees to grow, but receive more preciptation than deserts, which are the driest biome.

96. Savannah, tundra, grasslands, and temperate forest are examples of **biomes**. Biomes are regions that have a distinct climate.

97. --

98. --

99. Nitrogen is a primary component of **urine**. So, when animals excrete urine, they return nitrogen to the soil.  
  
Also, when an animal dies, the **decomposition** of its body **following death** returns many elements, including nitrogen, to the soil.

100. As energy travels from one trophic level **up** to the next in an energy pyramid, **there is a great amount of energy lost**. An average of only 10% of the energy from the previous level moves to the next level. The rest is used up or lost as heat energy.