

“Introducing Ecology & Environmental Science”

Write everything that
is Underlined

Essential Question(s)

- What is Ecology?
- What are biotic and abiotic factors?
- How are the levels of organization described?
- What is Environmental Science?
- What is the importance of “Keystone Species.”

Ecology

the study of the relationships between biotic and abiotic factors in environments

eco (G) root home, abode

log, -o, y (G) suffix study of

ecotourism

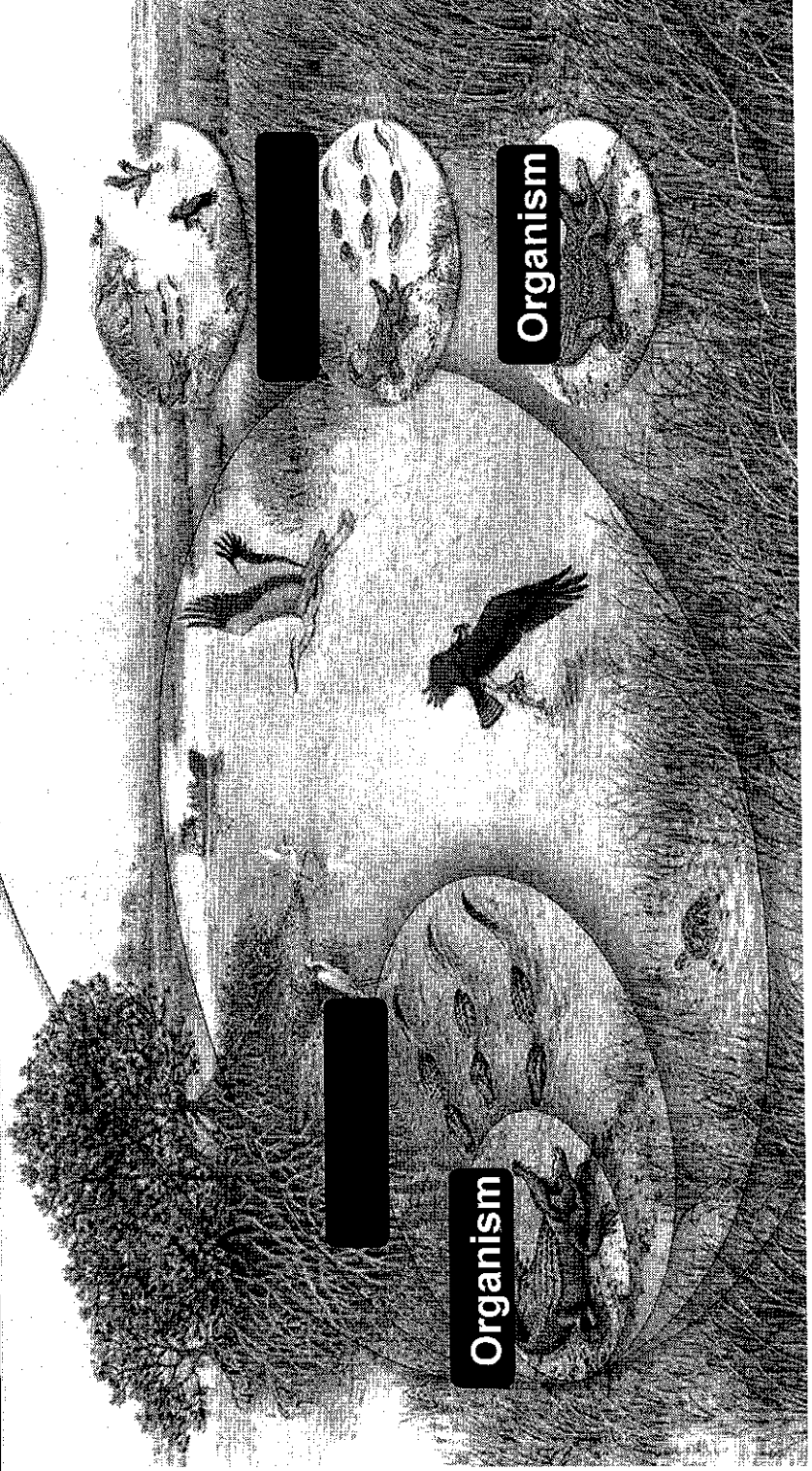
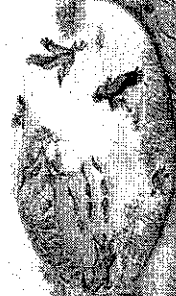
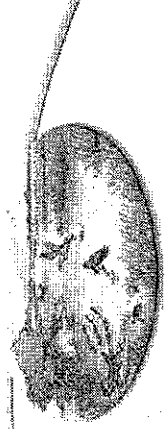
climatology

Environmental Science

- the study of the environment, and the solution of environmental problems.
Environmental science provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems.
- the need for a multi-disciplinary approach to analyze complex environmental problems

What two words in the bulleted statements are synonymous?

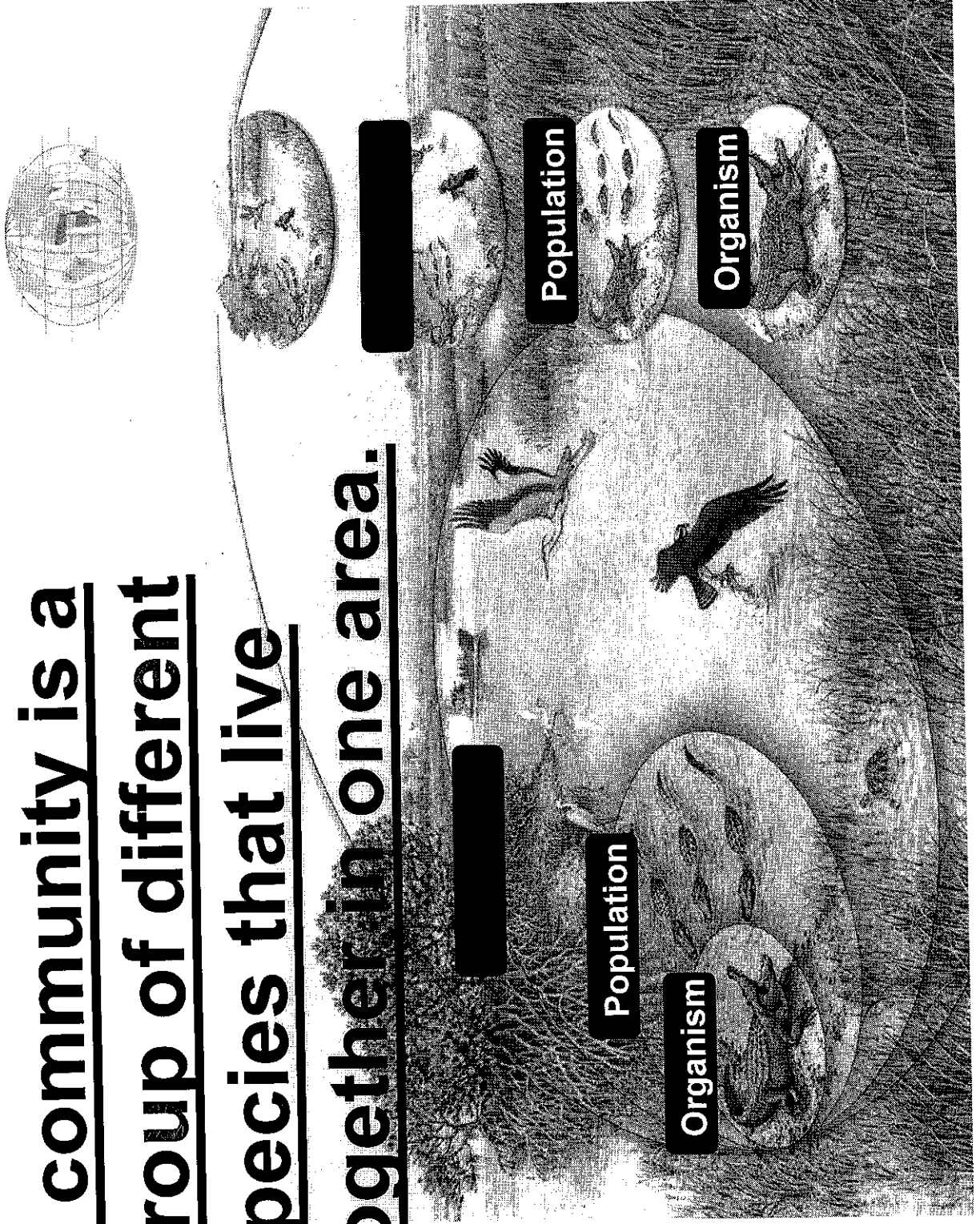
3. A population is a group of the same species that lives in one area.



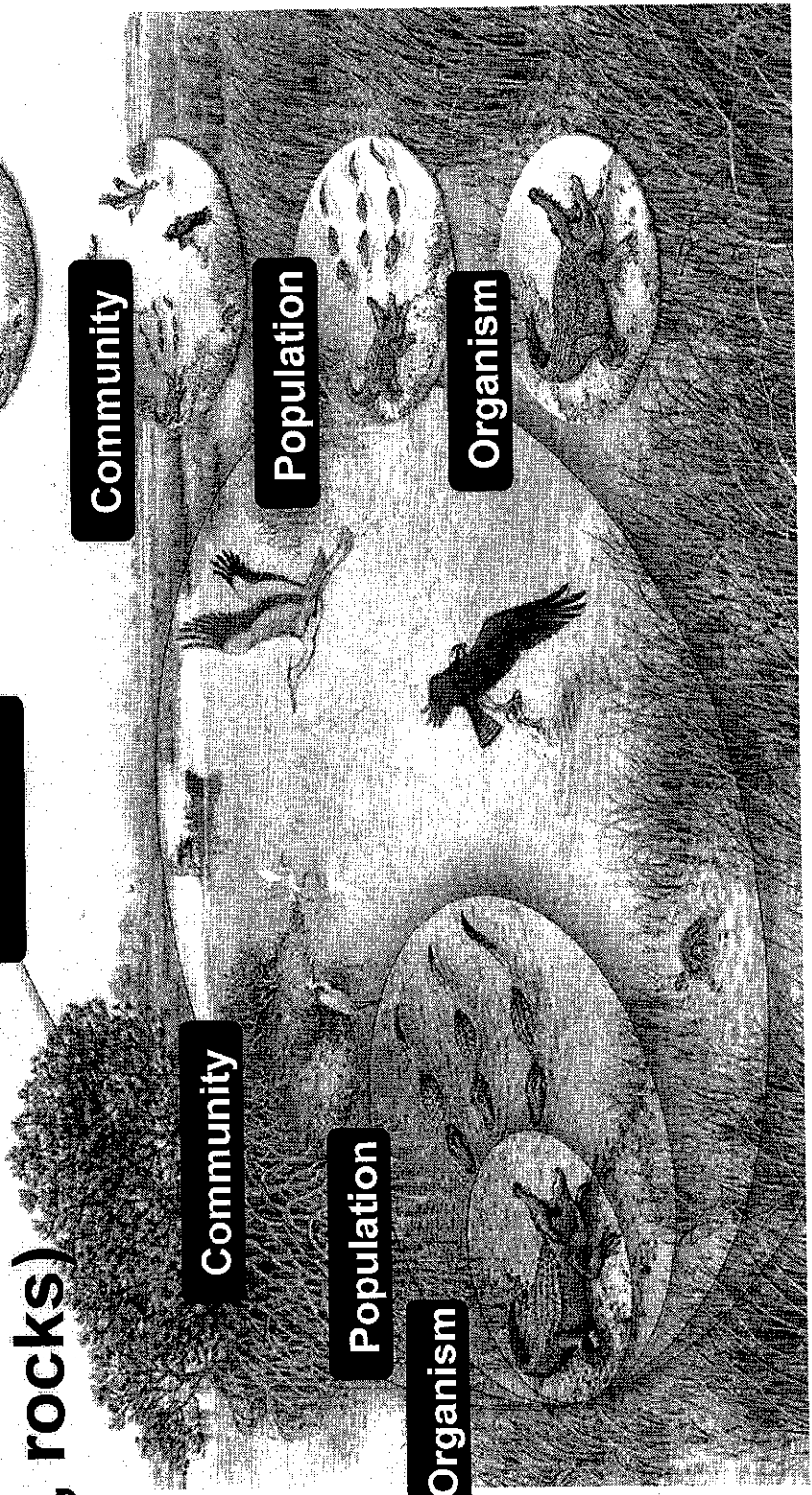
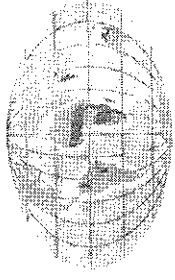
Organism

Organism

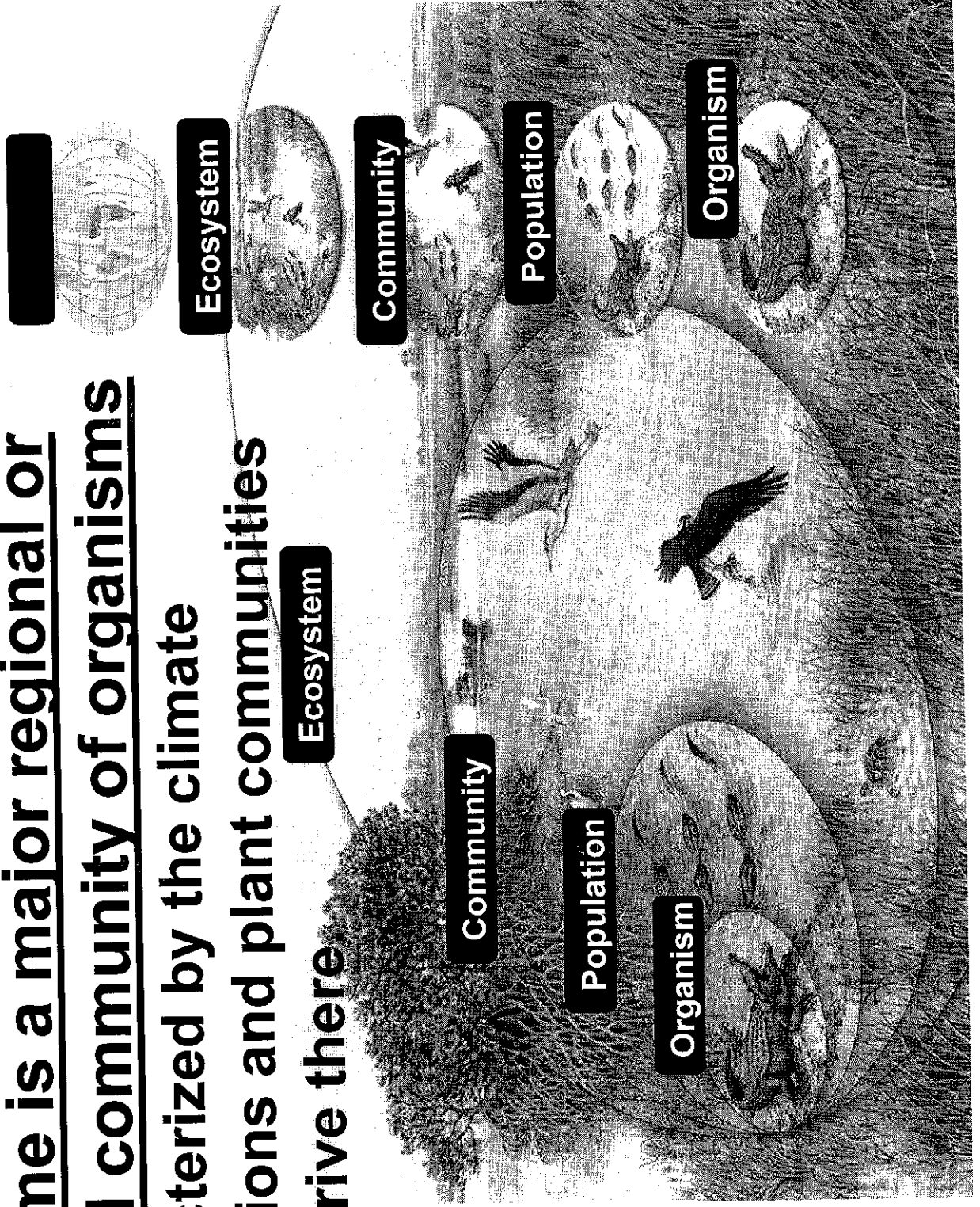
4. A community is a group of different species that live together in one area.



5. An ecosystem includes all of the organisms as well as the other nonliving things in a given area. (such as climate, soil, water, rocks)



6. A biome is a major regional or global community of organisms characterized by the climate conditions and plant communities that thrive there.



Biome

a major regional or global biotic community, a super ecosystem, defined chiefly by the dominant forms of plant life and the prevailing climate

Major Biomes of the World

desert

Grassland / Savannahs

tropical rain forest

deciduous forest

coniferous forest

highlands

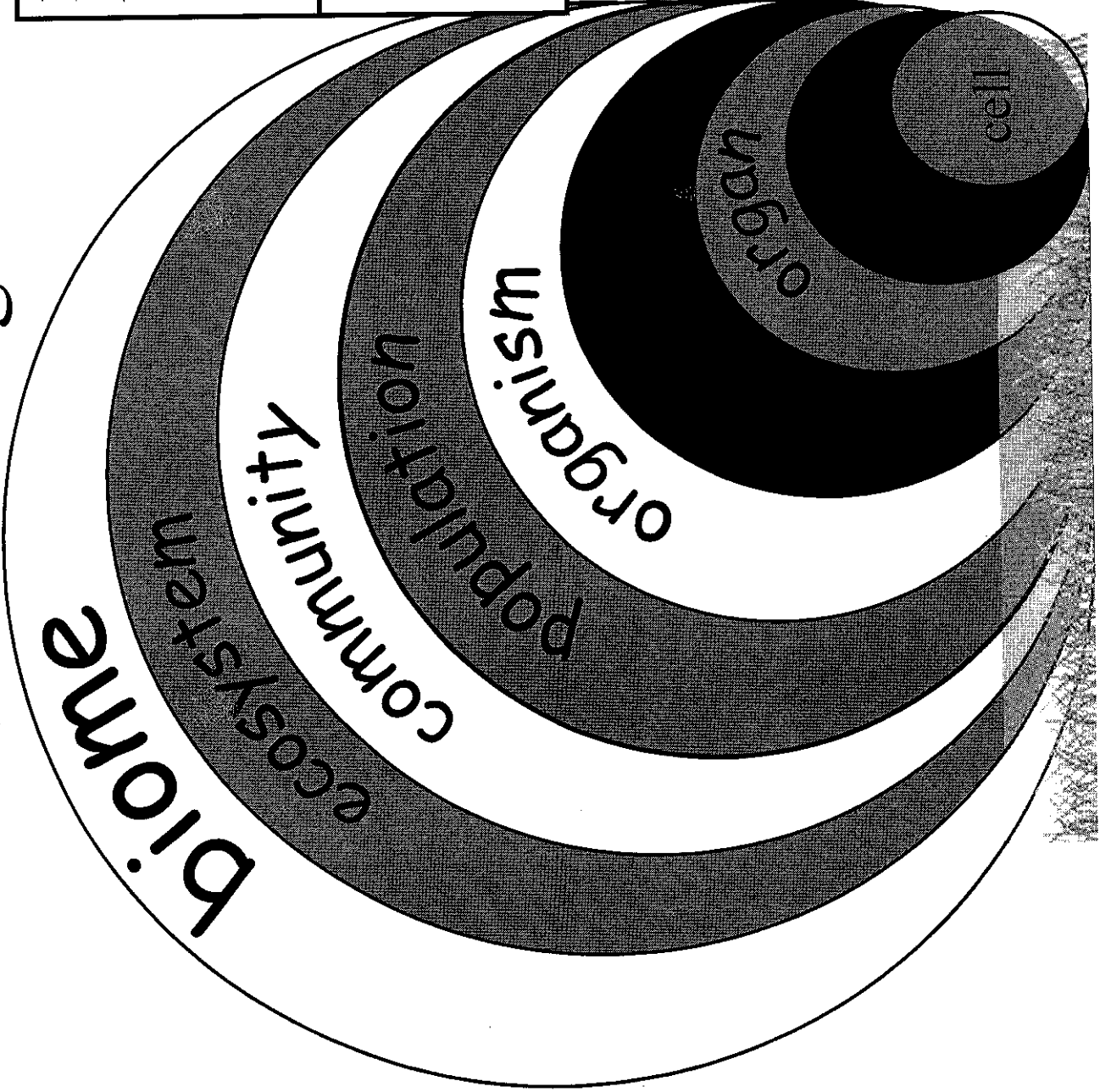
tundra

arctic

ocean

alpine

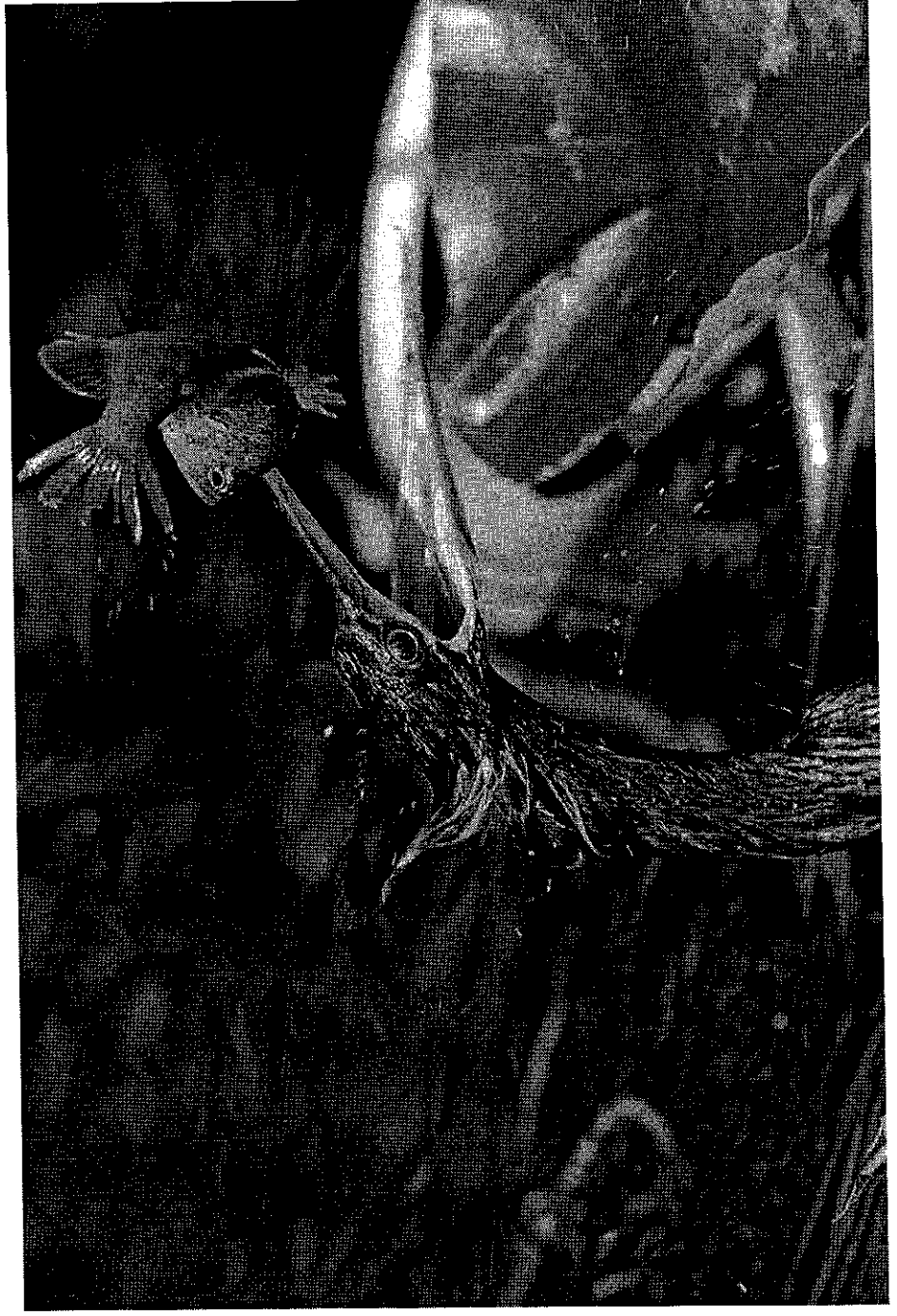
Levels of Organization



Large region with typical plants and animals that includes several ecosystems

What would you hypothesize as the next three levels of systems in this diagram?

While the earth is huge, life is found in a very narrow layer, called the **biosphere**. If the earth could be shrunk to the size of an apple, the biosphere would be no thicker than the apple's skin.



Hypothesis

- What would you hypothesize as the next three higher levels of systems in this diagram?

Really Tough Hypothesis

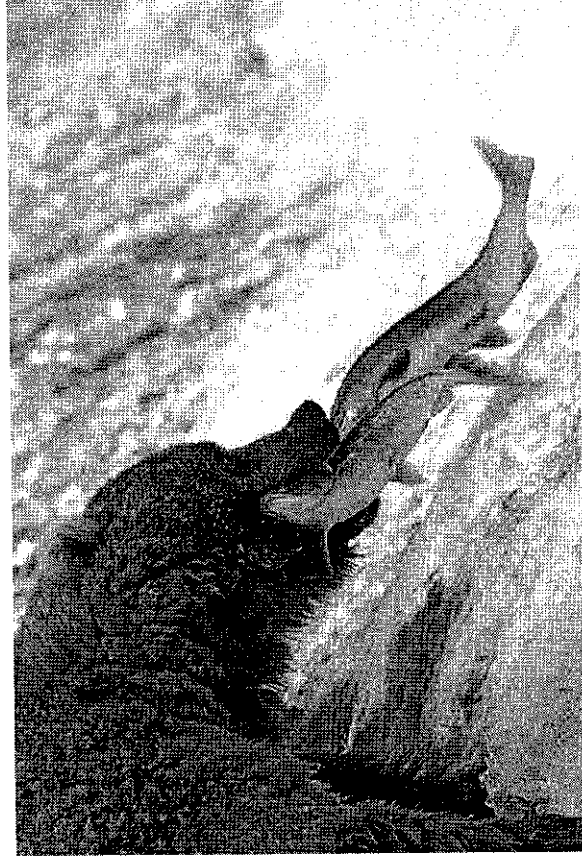
- What are two levels Of Organization that precede “cell”? Can you name more ?

KEY CONCEPT:

Every ecosystem includes both living and nonliving factors.



The biosphere, like the human body, is made up of systems that interact and are dependent on each other.



The biosphere's systems are called **ECOSYSTEMS**.

III. Elements in an Ecosystem

1. Biotic factors are living things.

- Remember, BIO means LIFE! (like Biology)

a. plants

b. animals

c. fungi

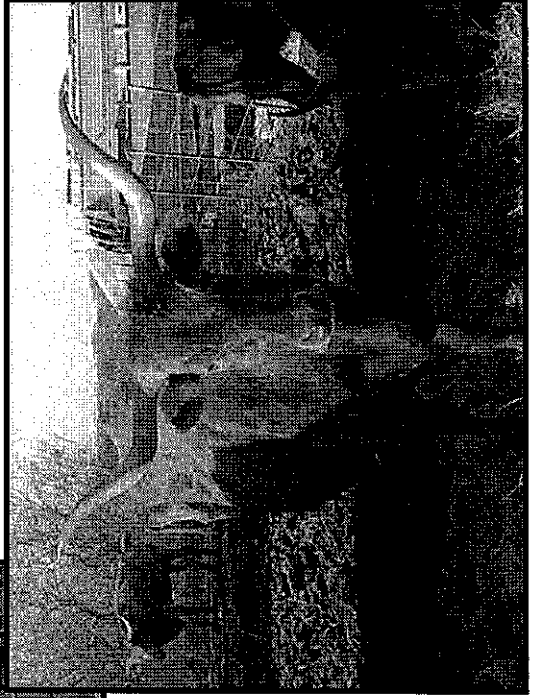
d. bacteria





Examples of Biotic Factors

include plants,
animals, fungi,
microorganisms



2. Abiotic factors are nonliving things.

- Remember, "A" means NOT (like Asymmetrical means not symmetrical)

a. sunlight

b. temperature

c. wind

d. Moisture

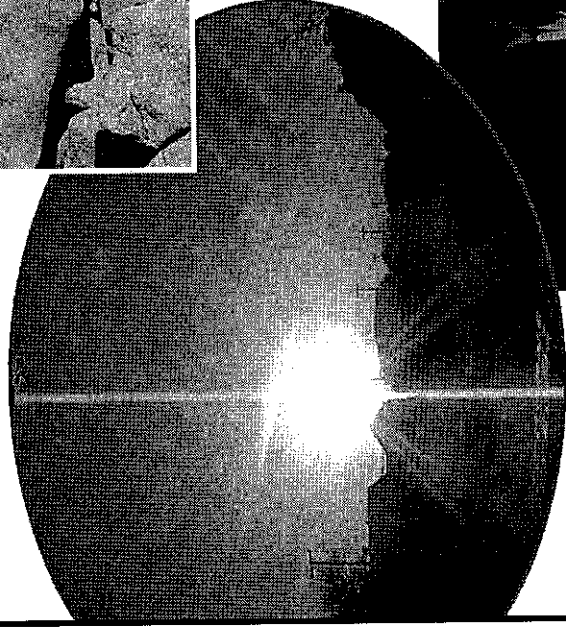
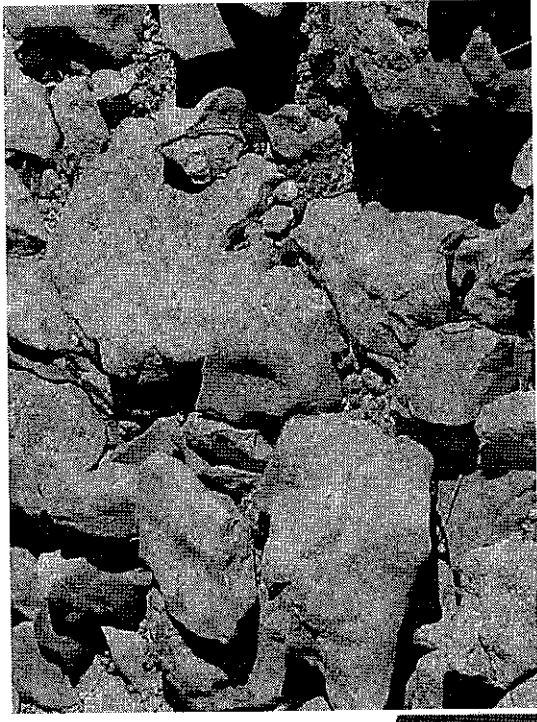
i. Water, rain, clouds

e. soil



Examples of Abiotic Factors

include air,
water, soil,
temperature,
wind, source of
energy (usually
sun)



Ecological Niche

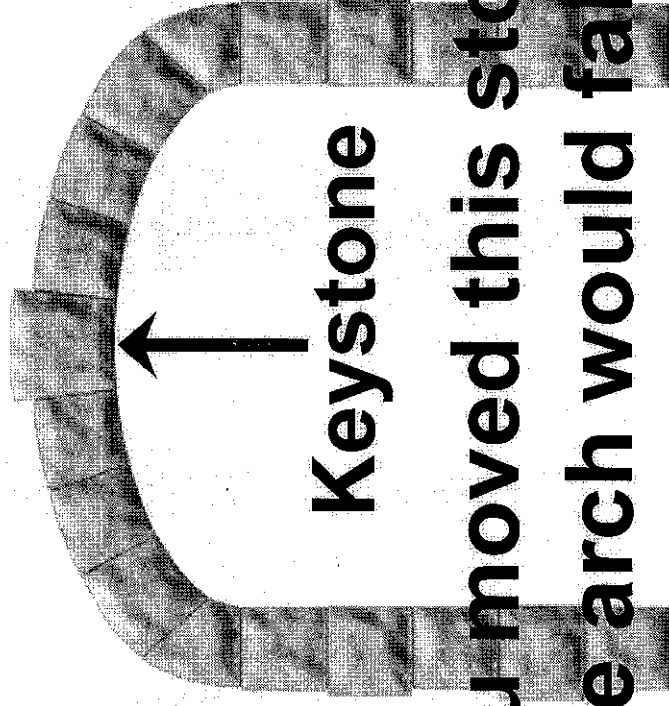
- A plant's or animal's ecological niche is a way of life that is unique to that species.
- Niche and habitat are not the same. While many species may share a habitat, this is not true of a niche. Each plant and animal species is a member of a community.
- The niche describes the species' role or function within this community.

- For example, the red fox's habitat, which might include forest edges, meadows and the bank of a river, is shared with many animals .
- The niche of the red fox is that of a predator which feeds on the small mammals, amphibians, insects, and fruit found in this habitat. Red foxes are active at night. They provide blood for blackflies and mosquitoes, and are host to numerous diseases. The scraps, or carrion, left behind after a fox's meal provide food for many small scavengers and decomposers. This, then, is the ecological niche of the red fox.
- Only the red fox occupies this niche in the meadow-forest edge communities. In other plant communities different species of animal may occupy a similar niche to that of the red fox.

Lets Think and Compare

- **List three animal species that could occupy the same niche as the red fox and three that would not.**

- Changing one factor in an ecosystem can affect many other factors.
- A keystone species is a species that has an unusually large effect on its ecosystem.



If you moved this stone the whole arch would fall down

Reintroducing Wolves to Yellowstone
National Park

<http://vimeo.com/86466357>

Beaver

<http://vimeo.com/28055044>

What Is an Ecosystem?

Lesson 1 Quiz

- 1** An ecosystem is made of both biotic and abiotic things. Which describes the biotic part of the ecosystem?
- (A) plants that grow in soil
 - (B) the animals that breathe oxygen
 - (C) all living things in the environment
 - (D) plants and animals that live in water
- 2** If you stand in the middle of an open field, you are standing among individual organisms, different species, populations, and communities. What makes up one of the populations in the field?
- (A) all organisms of the same species
 - (B) the different communities in the ecosystem
 - (C) the communities that occupy the same niche
 - (D) all organisms that live in a certain part of the field
- 3** The rainforests in South America support many ecosystems. These ecosystems are healthy. How does the diversity in the rainforests help determine the health of ecosystems?
- (A) When diversity is high, there are more resources available.
 - (B) Resources in the environment last longer when the diversity is low.
 - (C) Less diverse ecosystems have less competition among the residents.
 - (D) Areas with high diversity have increased competition among the residents.
- 4** Temperature, water, soil, and air are abiotic factors in an environment. They are not the same everywhere. What role do abiotic factors such as these play in an ecosystem?
- (A) They control the changes of the seasons.
 - (B) They prevent competition among populations.
 - (C) They determine which plants and animals can live there.
 - (D) They help control the effect humans might have on the ecosystem.
- 5** When scientists talk about an ecosystem and the type and number of animals and plants that live in one, they are also concerned about limiting factors. What are limiting factors?
- (A) the rate at which the plants and animals in an ecosystem reach maturity
 - (B) the ratio of animals that lay eggs to those that give birth to live young
 - (C) the things that are necessary to support a population of organisms in an area
 - (D) the difference between trees that lose their leaves in an ecosystem and those that don't

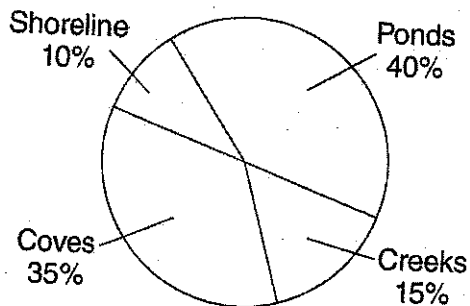
What Makes Up a Land Ecosystem?

- 1 In a 1-meter square sample site, students identified seven different types of consumers and two different types of producers. Which is the best way to classify the consumers?
- (A) by size
 - (B) by how they move
 - (C) by the type of food they eat
 - (D) by the type of food they make
- 2 Invasive plants compete with native plants for resources. Which statement describes what is **likely** to happen to native plants that compete with fast-growing invasive plants?
- (A) Their numbers will decrease.
 - (B) Their numbers will stay the same.
 - (C) Their numbers will increase slightly.
 - (D) Their numbers will increase greatly.
- 3 Megan's class has decided to restore an empty lot to the way it was before the town was built. Before they buy any plants or soils, what must they determine?
- (A) the average annual rainfall
 - (B) the factors that caused the plants to die
 - (C) what natural predators were once nearby
 - (D) which native plants used to live in the area
- 4 Dr. Dowlen is a paleontologist. She goes on a geology field trip to look at some interesting rocks in her area. One place has a large, flat surface covered with fossils. Is it possible for Dr. Dowlen to learn about this ancient ecosystem by marking out a grid?
- (A) No, because there are no organisms living there now.
 - (B) No, because the area is not completely flat and the grid would not be accurate.
 - (C) Yes, because the fossils are easy to see just as living organisms are easy to see.
 - (D) Yes, because the fossils in the rocks represent the organisms that once lived there.
- 5 Darien is planting a garden alongside her house. The space she can plant in is half in the shade and half in the sun. What types of plants should she plant to get the best results in her garden?
- (A) plants that are native to the area
 - (B) plants that live in filtered or somewhat shady conditions
 - (C) plants that are capable of living in both full sun and full shade
 - (D) plants that live in sun for one side of the garden and plants that live in shade for the other side

How Do Environmental Changes Affect Organisms?

- 1 A developer is planning a new housing development and is interested in protecting crocodile habitats. The graph below shows which habitats crocodiles prefer.

Adult Crocodile Habitat Preference



The developer wants to build where the fewest crocodile observations have occurred. Near which type of area is the developer **most likely** to place the new housing development?

- (A) coves
 (B) ponds
 (C) creeks
 (D) shoreline
- 2 Hurricanes that strike land are considered natural disasters. Why are hurricanes also considered seasonal disasters?
- (A) Hurricanes can cause major damage.
 (B) Hurricanes occur in areas all over the country.
 (C) Hurricanes develop only during certain times of the year.
 (D) Hurricanes strike only coastal regions and not areas that are far inland.

- 3 Carrotwood is a fast-growing landscape tree. Today, this tree is found in many habitats, including dunes, coastal areas, freshwater marshes, and riverbanks. It crowds out native plants and competes for light and other resources. Which term describes the carrotwood species?

- (A) native
 (B) natural
 (C) invasive
 (D) predatory

- 4 When an environment changes, differences between individuals can allow some plants and animals to survive while others die or move to new locations. Which statement **best** describes how this happens?

- (A) Environmental changes allow animals to survive, adapt, and vary.
 (B) All animals survive when the environment changes, which leads to their variations and adaptations.
 (C) Animals have variations that may allow them to adapt and survive when the environment changes.
 (D) Animals have adaptations that allow them to survive environmental changes, which leads to variation.

- 5 After large numbers of people moved to an area, several species of animals and plants became extinct. Which event **most likely** led to the extinction of so many species in a short amount of time?

- (A) natural disasters
 (B) habitat destruction
 (C) variations in the species
 (D) the change in the climate

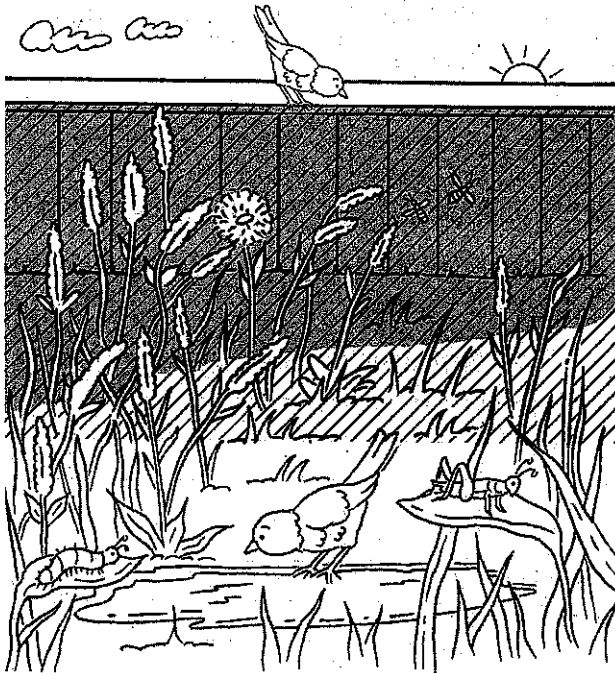
How Does Drought Affect Plants?

- 1 A marsh is an area of low, wet land. Baxter expected to see few plants there, but he observed many. Which **best** explains why plants are able to survive in the marsh?
- (A) Plants that grow in marshes have adapted to survive there.
 - (B) Plants can grow in a marsh for a short time before dying out.
 - (C) Plants need water, so all plants grow well in marsh conditions.
 - (D) Plants can grow in all conditions as long as they have sunlight.
- 2 Kendra placed a plant on her kitchen windowsill. When she returned from a vacation, the plant was wilted. Which of the following was the plant **most likely** lacking?
- (A) air
 - (B) salt
 - (C) light
 - (D) water
- 3 Tabatha made a clay pot in which to grow a plant. She made holes in the bottom of the pot so water could drain away. Which statement is the **most likely** reason it is important for the water to drain away?
- (A) Plants grow too quickly in wet soil.
 - (B) Plants are unable to grow in damp soil.
 - (C) Plants grow poorly if the soil is too wet.
 - (D) Plants need to be given fresh water daily.
- 4 A farmer plants corn every year. One year, the farm experiences a drought and receives less rainfall than is normal during the growing season. Which of the following is the **most likely** result?
- (A) The corn plants will not grow at all.
 - (B) The corn plants will be taller than they usually are.
 - (C) The corn plants will be shorter than they usually are.
 - (D) The corn plants will grow the same as they usually do.
- 5 An area near a river used to be almost constantly flooded. A dam was built upstream, and the land is now mainly dry. If it remains dry for several years, which change is **most likely** to happen?
- (A) The plants will die out until there are no plants left in the area.
 - (B) The plants will remain the same as when the land was flooded.
 - (C) The same plants will grow in the area, but they will grow faster.
 - (D) The types of plants will change to those plants better suited to drier conditions.

Ecosystems

Vocabulary

- 1 What does it mean for a backyard ecosystem to have low diversity?
- (A) The number of insect species is very low.
 - (B) There are more insect species present in the environment.
 - (C) The plant species outnumber the insect and other animal species.
 - (D) There are only a few different species of plants, animals, and insects.
- 2 Look at the plants in the picture below.



Which abiotic factor **most likely** controls where the plants in this environment live?

- (A) air
- (B) birds
- (C) shade
- (D) soil

- 3 What part of an environment are a swarm of bees?
- (A) ecosystem
 - (B) community
 - (C) niche
 - (D) population
- 4 Cutting down trees to make room for human population growth has negative effects on native plants and wildlife in an area. If an insect species lives in only a certain type of plant and that plant is removed, what part of the insects' life is being affected?

- (A) ecosystem
- (B) community
- (C) niche
- (D) population

- 5 What sorts of things make up an ecosystem?
- (A) the living and non-living things in the environment surrounding an organism
 - (B) all of the living things that interact with the organism being studied
 - (C) all of the non-living things that interact with the organism being studied
 - (D) the natural things in the environment that are affected by the organism being studied

Science Concepts

- 6 Garlic mustard is a plant that was brought to the United States from Europe. It spreads quickly and crowds out native plants in a short time. Today, it can be found all over Indiana. A garlic mustard plant produces 400–500 seeds that can sprout in sun or shade. What would be the best way for people to control garlic mustard?

- (A) Use herbicides to get rid of all the plants in an area.
- (B) Burn away the plants and change the soil so that nothing grows.
- (C) Pull up the garlic mustard or kill it before it produces seeds.
- (D) Replace garlic mustard with another fast-growing invasive plant.

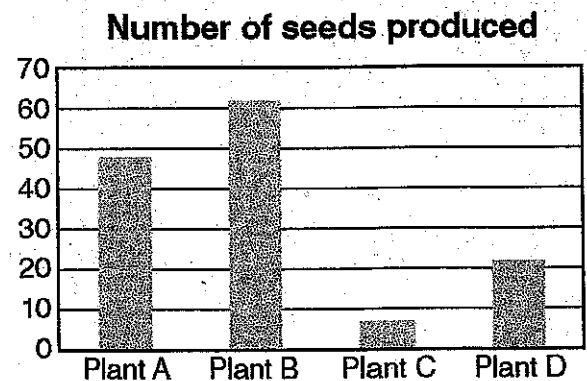
- 7 A controlled burn is when plants in an area are burned while being closely watched. A controlled burn can clear out lots of smaller plants in a wooded area or field. Which statement best describes the reason for a controlled burn?

- (A) natural disaster
- (B) habitat destruction by humans
- (C) clearing out small plants to prevent wildfires
- (D) preparing the land for building a subdivision

- 8 In a land ecosystem, some organisms are found beneath the soil under rocks, logs, or plants. How would these organisms be affected if all these types of soil coverings were removed?

- (A) Organisms would not be affected by this change.
- (B) There would be an increase in the diversity of organisms living in the soil.
- (C) There would be an increase in the number of decomposers living in the soil.
- (D) There would be a decrease in the total number of organisms living in the soil.

- 9 Some plants produce a large number of seeds. The more seeds that are produced, the more likely that some of them will survive, germinate, and grow. Examine the bar graph below.



Which plant is the **best** example of this life-cycle adaptation?

- (A) Plant A
- (B) Plant B
- (C) Plant C
- (D) Plant D

What Are Roles of Organisms in an Ecosystem?

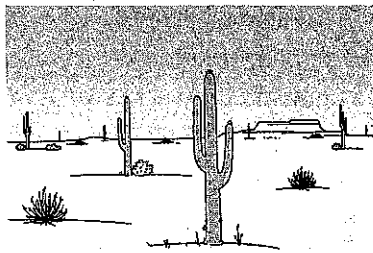
1 Some organisms break down dead things for food. Which word describes these organisms?

- (A) consumers
- (B) decomposers
- (C) herbivores
- (D) producers

2 How are decomposers like consumers?

- (A) They provide energy to producers.
- (B) They must capture prey in order to survive.
- (C) They can make their own energy from sunlight.
- (D) They get their energy from producers or other consumers.

3 Look at the desert scene pictured below.



To picture all of the types of organisms listed below, which types would you need to add to the scene?

- (A) consumers, decomposers
- (B) herbivores, producers
- (C) producers, herbivores
- (D) scavengers, producers

4 In the carbon dioxide-oxygen cycle, which organisms take in carbon dioxide and release oxygen as part of the process of making food?

- (A) animals
- (B) consumers
- (C) plants
- (D) plants and animals

5 What is the **primary** source of energy for this organism?



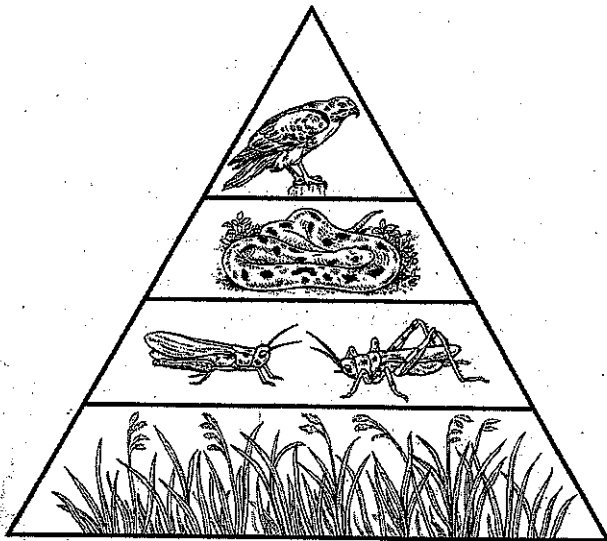
- (A) carbon dioxide
- (B) oxygen
- (C) soil
- (D) sunlight

How Does Energy Move Through Ecosystems?

1 People are part of food chains. What is the role of people in a food chain?

- (A) carnivore
- (B) consumer
- (C) decomposer
- (D) producer

2 Why is an energy pyramid drawn in the shape shown below?

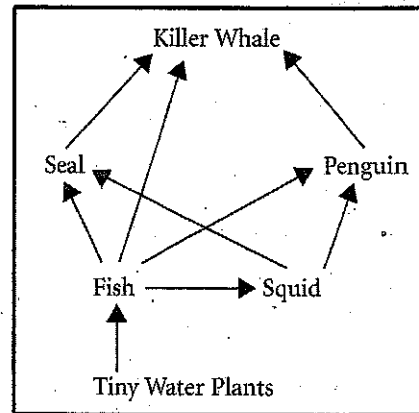


- (A) The higher the level is, the fewer the animals.
- (B) The higher the level is, the larger the organisms.
- (C) The higher the level is, the more important the animals.
- (D) The higher the level is, the more successful the predators.

3 At each level of an energy pyramid, 90% of the energy received from the lower level is used for life processes. Only 10% is stored and can be passed up to the next level. Which of the following statements is correct?

- (A) One snake can feed many hawks.
- (B) Hawks should eat grass to obtain the most energy.
- (C) There must be the same number of plants as animals.
- (D) Producers are the most numerous group of organisms.

4 Look at the food web in the picture below.



Which animals does the killer whale consume to obtain nutrients?

- (A) fish, squid, and seals
- (B) penguins, fish, seals, and squid
- (C) penguins, seals, and squid
- (D) seals, fish, and penguins

5 Which of these is a first-level consumer?

- (A) a bush
- (B) a cat
- (C) a deer
- (D) a fox

What Role Do Decomposers Play?

1 Ecosystems have producers, consumers, and decomposers. Why are decomposers important in an ecosystem?

- (A) They are herbivores and keep down the population of plants.
- (B) They are carnivores and keep down the population of animals.
- (C) They produce more food for other organisms.
- (D) They break down dead plants and animals.

2 Which of these things can function as a decomposer?

- (A) bread
- (B) leaves
- (C) fungus
- (D) rotting meat

3 In a rotting-log ecosystem, how are both the fungi that grow on dead bark and the beetles that eat the wood alike?

- (A) They are predators.
- (B) They are producers.
- (C) They are the decomposers.
- (D) They are the energy source.

4 Erin needs to complete the chart below.

Facts about . . .		
Consumers	Producers	Decomposers

Which statement belongs in the "Decomposers" column?

- (A) eat plants
 - (B) eat plants and/or animals
 - (C) use photosynthesis to make food
 - (D) return nutrients to the soil
- 5** A tree in the forest grows old and dies. It gradually falls apart inside, and finally falls over. In time, fungus is visible on the fallen log. What is this process called?
- (A) decomposition
 - (B) ecosystem
 - (C) molding
 - (D) producing