Ecology

Standard

6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept, students will know:

Concepts

a. bio-diversity is the sum total of different kinds of organisms and is affected by alteration of habitats

b. how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of non-native species, or changes in population size.

c. how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.

d. how water, carbon. And nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration.

e. a vital part of an ecosystem is the stability of its producers and decomposers.

f. at each link in the food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in the an energy pyramid.

g. * how to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change

11

Ecology Entry

Prompt 1: An ecosystem's producers (plants) and decomposers (fungi & microorganisms) are primarily responsible for the productivity and recycling of organic matter. **Explain this statement in detail. Use the hypothetical aquatic environment (from our lab) to illustrate the relationship between producers and decomposers.** (Need help? Text 48-54).

Prompt 2: The energy pyramid illustrates how stored energy is passed from one organism to another. **Describe how energy is transferred from one trophic level to the next by using a specific food chain. Be sure to identify the autotroph and specific types of heterotrophs in your food chain. Finally, explain why and how most energy is lost.** (Need help? Text pg. 48-54).

Prompt 3: Living things depend on non-living thing for life. At the organism level they depend upon natural resources and at the molecular level they depend on chemical cycles. Water, carbon and nitrogen are all necessary for the existence of life. **Explain in detail how chemical recycling of nitrogen and carbon occurs.** (Need help? Text pg. 55-59)

Final draft MUST be typed in 12-14 point fonts and 1.5 or double spaced. Handwritten papers will not be accepted.

Topic	Got It (12 pts)	Almost There (8 pts)	Start Again (1pt)
Explains how producers and decomposers are primarily responsible for the productivity and recycling of organic matter. Include example form aquatic environment lab.			
Describes how energy is transferred from one trophic level to the next using an example. Clearly identifies each organism in the food chain. Explains why and how energy is lost.			
Explains both the carbon and nitrogen cycles.			

TOTAL SCORE: _____/ 36 + Rough Draft 10 pts = _____/46

Got it: Covers topic completely with thorough discussion of major points or ideas BUT does not overdo explanation. Shows a solid understanding of topic area.
Almost There: Mentions topic but does not go into enough depth to show complete understanding. Shows basic understanding of topic area.
Start Again: Either does not mention or cover topic in enough depth. Shows limited understanding of topic area.

Vocabulary: Ecology

Name _____

Word Part	Meaning	Vocabulary Word
Troph	Nourish, food	
-ic	Pertaining to	Trophic
Auto-	Same	Autotroph
Hetero-	Different	Heterotroph
Photo	Light	Phototroph
Sphere	Ball	Biosphere
Lith	Stone	Lithosphere
Organ	Organ, instrument	Organic
-ism	The process of, interrelationship	Organism
Hatit-	Live, dwell	Habitat
di-	Across, through	
-verse	various	Diverse

Format

Word	Part of speech	Word parts
Definition		

Trophic		

Autotroph		

Heterotroph		

Phototroph		

Biosphere		

Lithosphere		

Organic		

Organism		

Habitat		

diverse		

M2

Ecology

_____ is the study of _____and their environment.

I. The _____The area of the _____ where _____

_____

Includes:

1. _____
2. _____ Rocks, crust, soil ...
3. _____: Nitrogen (N_2), Oxygen (O_2), Carbon Dioxide (CO_2)

_____

3. _____that live in the _____ and form a _____. All the gray squirrels on your street are part of a population.
4. _____: All the populations of species in a certain area. All the gray squirrels in your city are a community.
3. _____of a community.
4. _____of populations and their _____

_____

5. _____ is the _____has in its environment and includes _____it has

_____

II. _____

b. _____ Factors: The _____

b. _____ Factors: The _____ that interact in _____ between 2 or more _____:

* in competition for _____.
* between a _____
* in _____

1._____ - a _____where _____ and the other is _____. _____benefits but you do not.

2._____ _____ (bacteria) in your gut makes _____and _____

3._____and the _____ _____ is an example.

M3

2.2

III. _____ Levels:

1. Energy _____.

* Energy from the sun enters the ecosystem through the _____ by _____.

* Energy flows from _____ when they are _____

2. Producers: _____ organisms like _____ manufacture all the _____ matter through _____ and trap _____ for the ecosystem

3. _____:_____ are organisms that _____

* The _____ eats the _____. An example would be a _____ that eats the _____.

* _____ eat the _____.

* A _____ eats the _____

4. Consumers are classified by what they eat.

* _____ eat _____
* _____ eat _____
* _____ eats _____

Why must each ecosystem contain producers?

5. _____ are consumers that eat _____

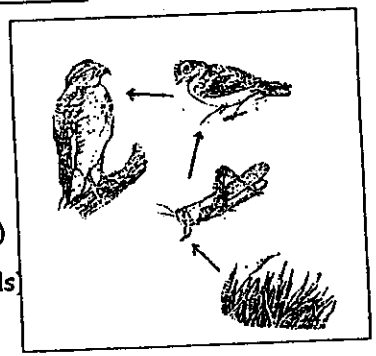
6. _____ are organisms that _____ tissues and wastes into _____, _____ and _____ and return them to the _____ for the _____ to use.

_____ are examples of decomposers.

What level would you place humans?

_____ The _____ energy from one _____ level _____.

* FOOD CHAINS are a _____ in which organisms obtain _____ in an _____



_____ consumer (hawk)

_____ consumer (sparrow)

_____ consumer (grasshopper)

_____ (grass and grass seeds)

A food chain is usually only _____.

* Although we don't usually think of _____ they, too _____ _____ from the _____ and can _____ at any level.

* The amount of energy available to the next _____ level _____ about _____ with each level.

_____ include all the _____ in an _____.

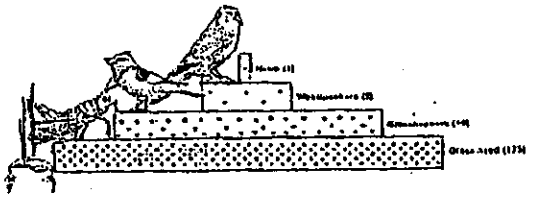
snakes hawks spiders

mice rabbits birds insects

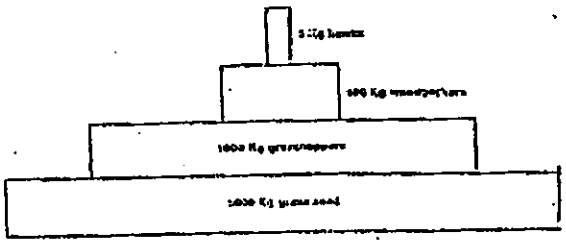
grasses & seeds bushes trees bacteria/fungi

_____

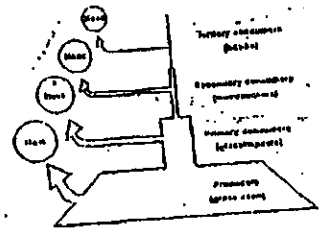
* _____ compare the number of _____ at each trophic level.



* _____ compare the amount of biomass at each level.



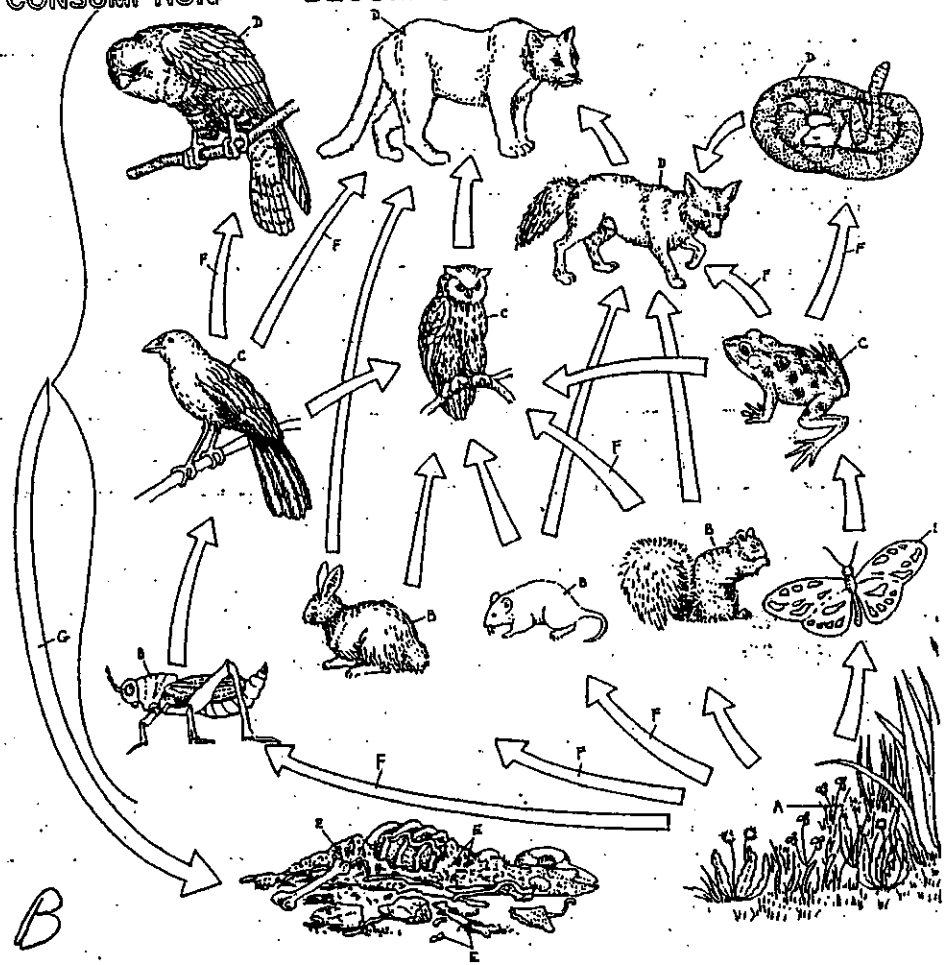
* _____ compare the _____ in each trophic level. It is measured in _____ (c) or _____ (C). The term _____ that we are familiar with is actually a _____



A

COMMUNITIES.

TROPHIC LEVELS.
PRODUCER.A
HERBIVORE (PRIMARY CONSUMER).B
PRIMARY CARNIVORE (SECONDARY CONSUMER).C
SECONDARY CARNIVORE (TERTIARY CONSUMER).D
DECOMPOSER.E
FOOD WEB.
CONSUMPTION.F DECOMPOSITION.G



B

Communities

1. No living organism exists entirely by itself. It is always profoundly influenced by its environment. The branch of biology that studies the relationships between living organisms and their environments is known as ecology (Greek: oikos, "house"). Ecologists concentrate much of their studies on communities and ecosystems. A community is defined as all of the organisms living in a given area and interacting with one another. An ecosystem is a community plus all of the non-living components of its environment. This plate shows some of the components of a typical biological community and their relationships.

2. Within a community organisms are categorized into different "trophic levels" according to how they nourish themselves (Greek: trophe, "nourishment"). The most important organisms are the producers, the green plants that capture the energy of sunlight to make the energy rich organic molecules on which all the rest of the community depends. (In some communities, algae or even certain bacteria may be the important producers.)

3. Feeding directly on the producers are the herbivores (Latin: herba, "grass"; vorare, "to devour"), also known as primary consumers. Familiar members of this group include grasshoppers, butterflies, and other herbivorous insects, rabbits, squirrels, mice, and seed-eating birds.

4. Animals that feed on the herbivores are called primary carnivores (Latin: caro, "flesh"). They are also called secondary consumers. It's unfortunate that they are "primary" one time and "secondary" another, but both naming systems are widely used. If you think about what the words actually mean, it really isn't too difficult to keep them straight. Include among the primary carnivores are such animals as foxes, owls, frogs, insectivorous (insect eating) birds, and predatory insects such as the praying mantis.

5. Animals that feed on primary carnivores are called secondary carnivores (or tertiary consumers). A snake that eats a frog is a secondary carnivore. So is a hawk that eats an insectivorous bird. Nature, of course, does not entirely cooperate with our desire for nice neat categories. A fox may eat a frog, becoming a primary carnivore in the process. Similarly, a mouse may eat an occasional insect, becoming thereby a primary or even a secondary carnivore, depending on what kind of insect it eats. Some animals, such as humans, baboons, and rats, routinely feed at all levels and are called omnivores (Latin: omni, "all"). Recognizing that they various categories of carnivores are over simplifications, ecologists still find them useful, and carnivores and omnivores are traditionally assigned to the highest trophic level at which they feed.

6. Feeding on all other levels is the group called decomposers. (They are sometimes called reducers, they do not reduce things in the chemical sense; they live by oxidation.) We don't apply the term "omnivore" to the member of this group, bacteria and fungi, because they do nearly all their feeding on dead organisms. The decomposers break down the dead remains of all species (including their own) into small, inorganic molecules that are released into the soil and water to be recycled as nutrients for the producers.

7. The pattern of the flow of energy and matter within a community is often referred to as a "food web." In the community illustrated here, that pattern is shown by the arrows, which indicate the transfer of energy and matter from one organism to the next. Only the direction of flow is shown not the quantity of energy or matter. Those quantities are customarily shown by means of ecological pyramids, illustrated in the next plate.

MLO

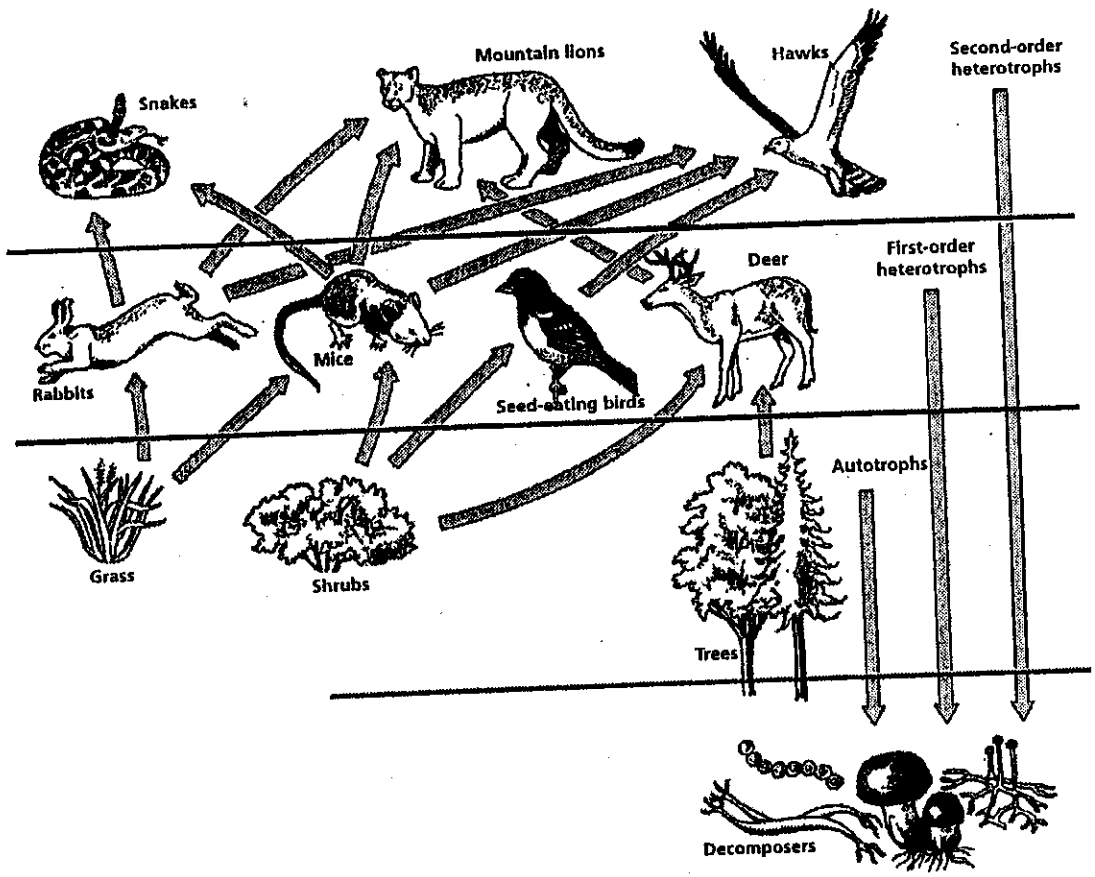
Name _____

Summary Sentences

Paragraph 1
Paragraph 2
Paragraph 3
Paragraph 4
Paragraph 5
Paragraph 6
Paragraph 7
4 overall Summary sentences

Name _____

A Food Web



1. At which level of the food web is the supply of energy the greatest?

   EXPLAIN

2. Which feeding relationship do first-order heterotrophs (primary consumers) have in common?

3. Which feeding relationship do second-order heterotrophs (secondary consumers) have in common?

4. **Explain** why plants are called autotrophs.

5. Food webs and food chains both involve multiple trophic levels. How do they differ?

6. Use the picture at the left and **describe** a food chain that includes a mountain lion and a shrub.

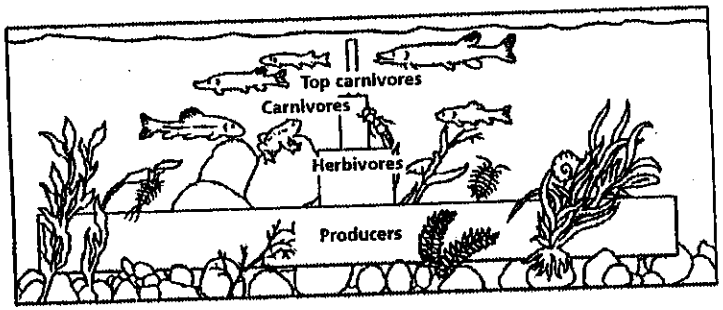
7. How might organisms pictured in the food web be affected if most of the mouse population was destroyed by disease? **EXPLAIN**

M4

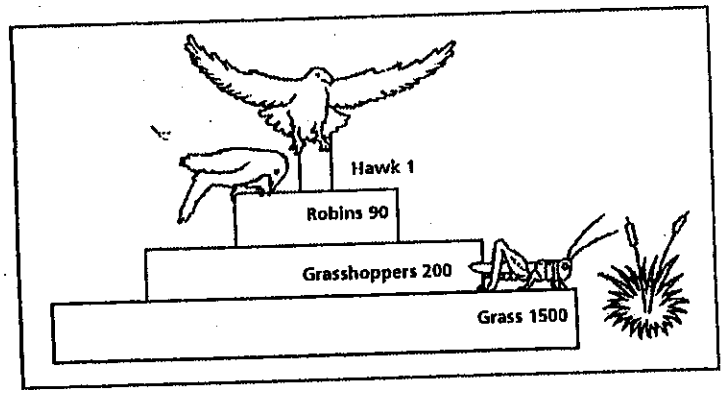
Name _____

Flow of Energy

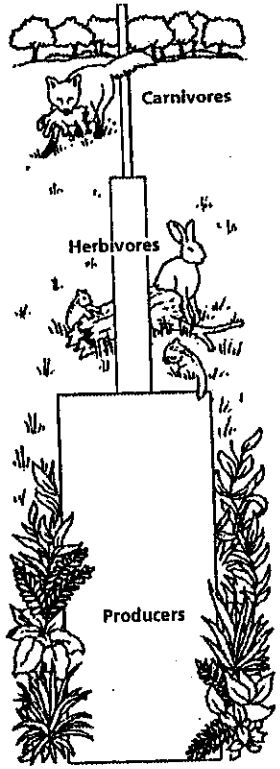
Pyramid of Energy



Pyramid of Numbers



Pyramid of Biomass



1. What is the ultimate source of energy for all ecological pyramids shown in the pictures?

2. In general, what kind of organism makes up the BASE of the ***Pyramid of Energy***? Give **SPECIFIC** examples.

3. Examine the ***Pyramid of Energy*** and **EXPLAIN** why only about 10% of the energy is available at one level is transferred to the next higher level.

4. How is the energy loss from one level to the next reflected in ***the Pyramid of Numbers?***

5. Suppose an ecosystem has a greater number of individual herbivores than producers. How might this affect the shape of the ecosystem's ***Pyramid of Numbers?***

   DRAW what it would look like in the blank area to the left.

6. What QUANTITY does the ***Pyramid of Biomass*** express?

7. **EXPLAIN** how biomass is calculated.

Chapter 2 Principles of Ecology

2.1 Organisms and Their Environment

Pages: 37-47

What is Ecology

Main Idea

Supporting Detail			

Aspects of Ecological Study

Main Idea

Biosphere -

Abiotic factors -

Biotic factors

Levels of Organization

Main Idea

Population -

Community -

Ecosystem -

Name _____

Organisms in Ecosystems

Main Idea

Supporting Detail			

Habitat -

Niche -

Commensalisms -

Mutualism -

Parasitism -

Section Review Questions 1-5

1. List several different biotic and abiotic factors in an ecosystem

2. Compare AND contrast populations and communities
   How are they ALIKE (compare)

   How are they different (contrast)

3. Give examples that would demonstrate the differences between the terms niche and habitat.

4. A leaf eating caterpillar turns into a nectar eating butterfly. How is this feeding behavior an advantage for this species?

5. Clownfish are small, tropical marine fish usually found swimming among the stinging tentacles of sea anemones. What type of symbiotic relations do these animals have if the clownfish are protected by the sea anemone, but the anemone does not benefit from the clownfish

2.2 Nutrition and Energy
Pages: 48-59
How organisms obtain energy.

Main Idea

Autotrophs –

Heterotrophs –

Scavengers –

Decomposers –

Food chain –

Trophic level –

Food web –

Name _____

Cycles in Nature

Main Idea

Supporting Detail			

Section Review 1-5

1. What is the difference between an autotroph and a heterotroph?

2. Why do autotrophs always occupy the lowest level of ecological pyramids?

3. Give two examples of how nitrogen cycles from the abiotic portion of the environment get into living things and back.

4. Describe a food chain that WAS NOT presented in this section.

5. The country of Avorare has many starving people. Should you encourage the people to grow crops such as vegetables, wheat, and corn or is it better to encourage them to use the land to raise cattle for beef? **EXPLAIN!!**

Evolution and Ecosystems

- _____ is the process by which _____ evolve in _____

Desert plants have a _____ and _____ to _____ _____.

- Examples of coevolution include the _____ _____ and their _____ and between _____

Plants use _____ to _____ that _____.

* _____ between _____ are types of _____

- _____ A relationship _____ _____ from another species _____ _____ that _____ any benefits in return.

_____

Humans and _____

Boxing Crab protects the _____

B. _____: _____ live in a way where _____ and are _____ on the relationship.

Lichen: _____

Humans: E Coli provides _____

C. _____: A _____ in which _____ (the _____) _____ to the _____ of the other species (the _____).

_____ and Oak trees

_____ and dogs/cats

_____

_____ interact and result in conditions that are _____ and _____.

_____ are important parts of the ecosystem.

They are either _____

_____

_____ are limited by the _____

_____ is limited by _____

_____ could result in the _____ _____.

The _____ is also very different. _____ need very _____ and others, like the _____, can live _____.

_____

The _____ _____ given a set of _____ It occurs in stages

_____: colonization of _____

_____ When the _____ their _____ for the next _____ to grow.

Eventually there is a _____ which is a _____ _____

_____ is what occurs when _____ _____. Since life was once there _____

114

_____

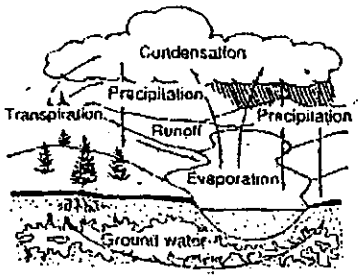
Between the abiotic and biotic factors.

* _____ determine the success of _____.

* Plant life affects the _____.

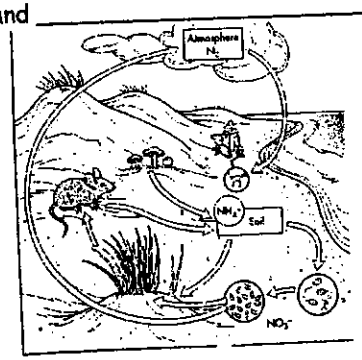
* The more _____ the _____ elements, the more diverse the _____ in the region or world. The process by which _____ materials move from the _____ into living things and back again is called a _____.

B. The _____ cycle.



How do you think deforestation affects the water cycle?

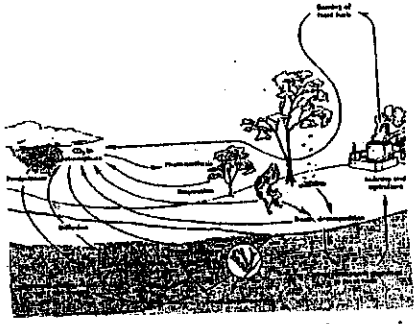
B. The _____ cycle. Plants and animals need nitrogen to build _____ and _____.



M12

What is the role of nitrogen Fixing Bacteria in the Nitrogen cycle?

The _____ cycle. Plants need _____ for _____. Animals need _____



How is human interference in the carbon cycle causing an increase of global temperatures

The _____cycle. All organisms need _____ for _____ and other components.

Cycle Video

Nitrogen Cycle

1. An important process in ecosystems is the recycling of nitrogen through its living (biotic) and nonliving (abiotic) components. The living component, or biota, of the ecosystem participate in the nitrogen cycle in a number of ways, as you will see in this plate.

2. Approximately 78% of the air is composed of diatomic nitrogen. Nitrogen is composed of amino acids and nucleic acids. Even ATP, the basic energy currency of living things, contains nitrogen.

3. Neither plants nor animals can obtain nitrogen directly from the atmosphere (A). Instead, they must depend on a process called nitrogen fixation (B). Key players in nitrogen fixation are legumes (C) and the symbolic bacteria that are associated with their root nodules are nitrogen-fixing bacteria (D). These bacteria convert nitrogen in the soil to ammonia (NH3), which can be taken up by some plants. The bacteria an the plant are in a symbolic relationship Cyanobacteria are also nitrogen-fixing bacteria; they are prominent in aquatic ecosystem.

4. Nitrogen is fixed into the soil through the actions of free-living bacteria and, as we mentioned above, through bacteria that's associated with root nodules of legumes. Both of these method of fixing nitrogen lead to incorporation into ammonia (NH3) in the process known as ammonification (E). The soil is a major reservoir for ammonia and other nitrogen-containing compounds. After nitrogen has been fixed, other bacteria convert it into nitrate, in a process called nitrification (F). In the first step of nitrification, Nitrosomonas (G) convert ammonia to nitrate (NO_3), by Nitrobracter (H). The nitrate (NO3) is then consumed by plants (I), as the diagram shows.

5. But not all plants consume nitrate; as we mentioned before, some plants are able to use the ammonia from the soil. In both cases, nitrogen enters the primary producers in the biotic community. The plants may then be consumed by animals (J). Herbivores are the primary consumers, and the nitrogen of the plants is used for the synthesis of key organic compounds such as amino acids, proteins, and nucleic acids.

6. The final aspect of the nitrogen cycle is the process of dentrification (K). This process is performed by a variety of microscopic bacteria, fungi, and other organisms, and nitrogen is released in the atmosphere (A). This completes the nitrogen cycle.

Name _____

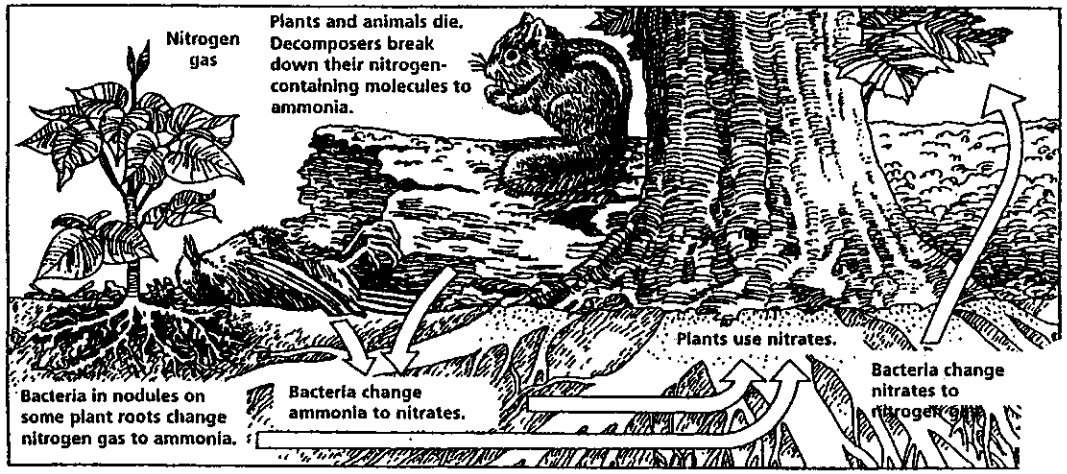
Summary Sentences

Paragraph 1
Paragraph 2
Paragraph 3
Paragraph 4
Paragraph 5
Paragraph 6
Overall Summary

M13

Name _____

The Nitrogen Cycle



1. What percent of the air consists of Nitrogen gas? _____

2. Bacteria in the roots change nitrogen gas in to what forms?

_____ _____

3. What is the role of decomposers in the nitrogen cycle?

4. How do plants obtain the nitrogen the need?

5. How do herbivores obtain the nitrogen they need?

6. How do carnivores obtain the nitrogen they need?

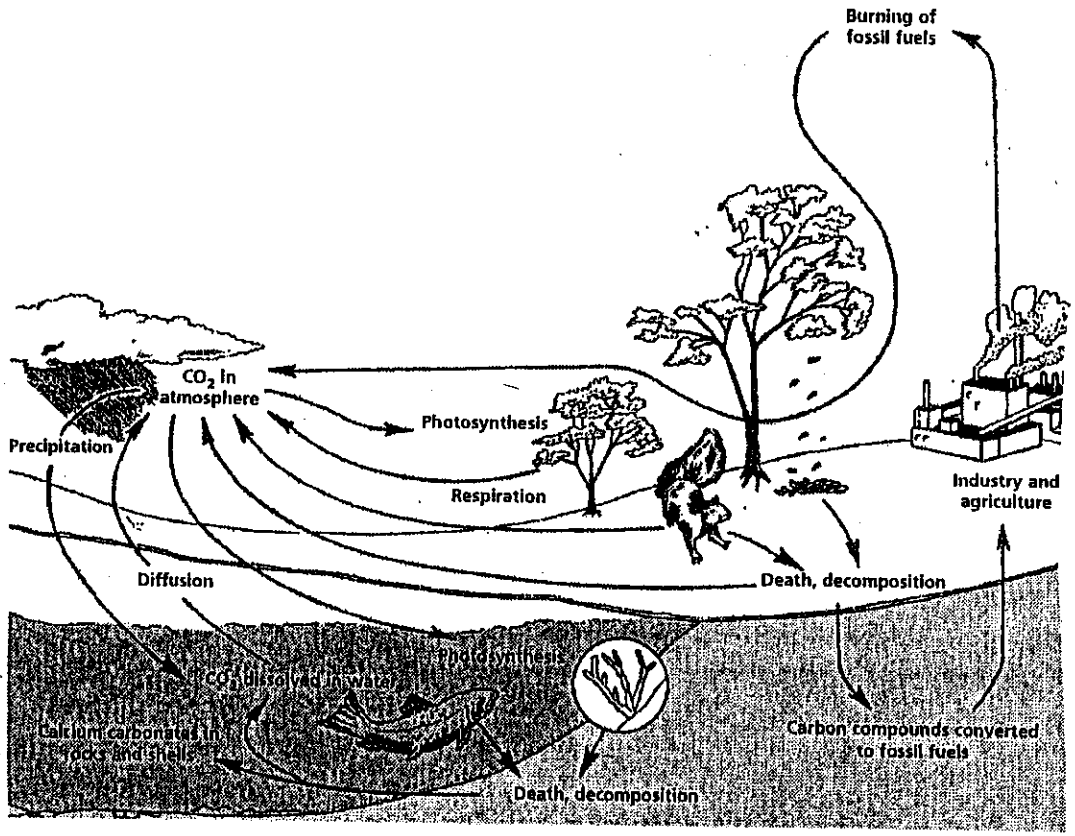
7. According to the picture at the left, how is nitrogen returned to the atmosphere?

8. What would be the impact on the immediate nitrogen cycle if there were a decrease in decomposition in a given ecosystem.

M14

Name _____

The Carbon Cycle



1. What is the process by which PLANTS convert carbon dioxide into energy-rich carbon compounds?

2. Explain what can happen, over millions of years, to the carbon compounds in organisms that die and decompose in the oceans.

3. What processes (NON-HUMAN) in the picture release carbon Dioxide into the atmosphere?

4. Identify TWO MAJOR reservoirs of CO_2 on Earth.

_____ _____

5. What are the forms in which carbon is found in the oceans?

_____ _____

6. How do plants and animals help maintain a balance of carbon dioxide in the atmosphere?

7. Atmospheric carbon dioxide produces a so-called 'green house effect" by trapping heat near Earth's surface. What human activities might tend to increase the greenhouse effect?

MS

Carbon Cycle

1. Energy flows from the sun in to the biosphere, but nutrients do not enter the biosphere from and outside source. Essentially, the same pool of nutrients has circulated for the billions of years that the Earth has been in existence. Some nutrients, called macronutrients, are used by organisms in large quantities. Macronutrients include carbon, hydrogen, oxygen, nitrogen, and phosphorous; micronutrients include iodine, iron, zinc, and some others.
2. Both macronutrients and micronutrients are recycled; they are passed back and forth between living and nonliving components of the ecosystem in processes that we call biogeochemical cycles.
3. Materials are incorporated into organic compounds by producers. Producers are then consumed by primary consumers who are consumed by secondary consumers, and decomposers are ultimately responsible for releasing the material back into the nonliving environment.
4. We will begin our study of the carbon cycle with the **atmosphere**, which is the Earth's major reservoir of carbon, in the form of carbon dioxide. Carbon enters the biotic (living) part of the ecosystem through **photosynthesis**. Plants of the **forest** take the carbon in carbon dioxide and uses it in organic compounds such as glucose, starch, cellulose, and other carbohydrates. **Respiration in plants** returns carbon dioxide to the atmosphere; an arrow shows this process
5. Plants are primary producers. In the course of **plant consumption**, carbons passes into primary consumers, animals. When **animal consumption** occurs, or when the primary consumer is eaten, carbon passes to a secondary consumer, represented by the lion in the plate. **Respiration** takes place in cells of the primary and secondary consumers, and carbon is released back onto the environment as carbon dioxide.
6. When the primary and secondary consumers die, their organic matter enters the soil through he process of **decay**. It is broken down by the decomposers, or **detritus feeders**, which are small animals and microorganisms that subsist on decaying matter such as fallen leaves, dead bodies, and animal waste. Earthworms, mites, centipedes, insects, and crustaceans are detritus feeders. Thus, **respiration of detritus feeders** also returns carbon to the atmosphere.
7. Throughout history, much of the carbon has been **converted to fossil fuel**. High pressure and temperature transform carbon-carbon organic matter into coal, oil, and natural gas. **Fossil fuel processing** follows. There are many **uses for fossil fuels**. Some power plants, generate electricity using fossil fuels and automobiles are powered by gasoline. **The products of combustion** of fossil fuels include carbon dioxide, and other carbon compounds that enter the atmosphere. Carbon also enters the environment from the burning of wood and plants that occurs during a forest fire
8. A final aspect of the carbon cycle that we will examine is **exchange with oceans**. Some carbon dioxide from the air dissolves in oceans and combines with calcium to form calcium carbonate, which is incorporated into the shells of mollusks and other creatures. When these shells decay, they transform into limestone, which, over time, dissolves as it is exposed to water. Carbon is released from the limestone and may return to the atmosphere

Name _____

Summary Sentences

Paragraph 1
Paragraph 2
Paragraph 3
Paragraph 4
Paragraph 5
Paragraph 6
Paragraph 7
Paragraph 8
Overall Summary

M16

_____

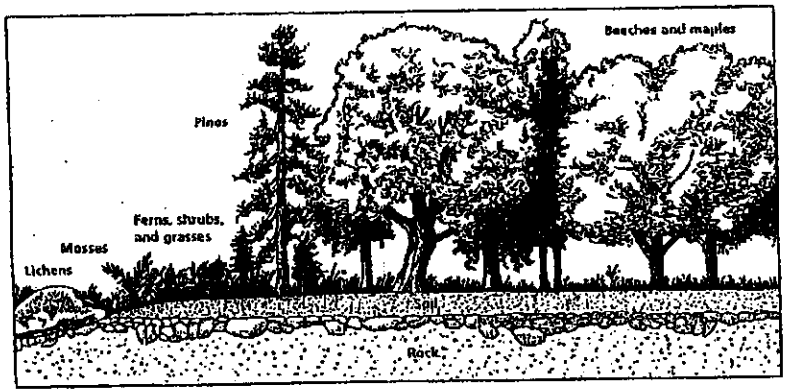
I. _____ - these are _____ factor that _____. It could be

a. _____
b. _____
c. rainfall

_____ can _____ of _____and they will live in a bigger area

_____ _____ due to _____ the previous organism made. _____ (symbiotic relationship between algae ad fungi) makes _____ _____ and grass for bushes.....

a. _____ First species in an area finally reaching a climax (top) community able to live in that area. Often a type of tree: oak, pine



Video:

- e
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- o
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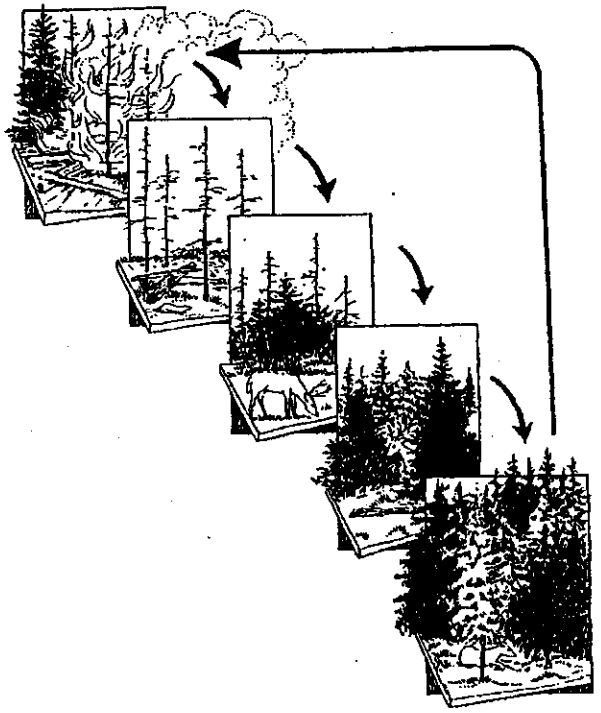
M17

c. _____ is the sequence of changes after a disruption: _____



II _____

A. A _____identified by the presence of _____ _____

1. Identified by the _____
2. Dependent upon the _____ of the habitat:

* _____ * _____ * Te_____

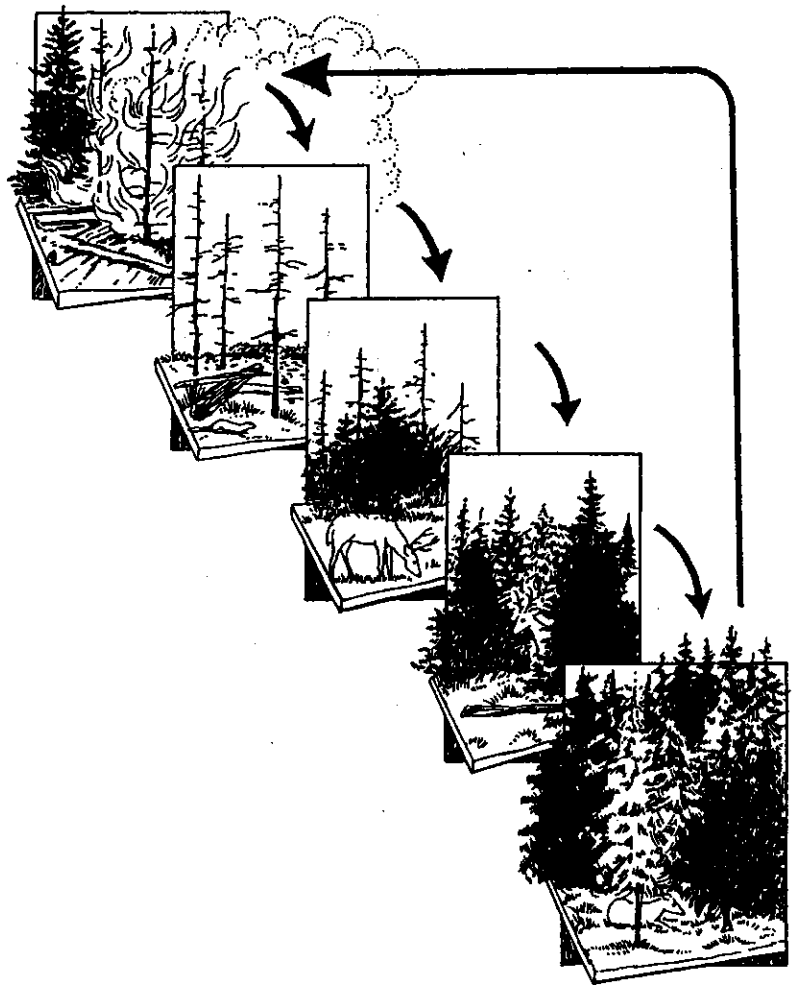
_____: _____ _____ consisting of interacting _____ _____ _____

Name _____

Use with Chapter 3, Section 3.1

Secondary Succession

As you work on this exercise, remember that plants compete for sunlight, nutrients, and water and that it takes a pine tree about 15 years to grow to about 30 feet



The picture shows what biologists noticed happened at Yellowstone Park in the years following the most extensive fire in its history where about 45% of the park burned.

1. a. After the fire, what resources remained at Yellowstone?

   b. How are these resources different from those found in an area such as a lava flow, where no life existed before.

2. In the first stage of secondary succession, grasses and wildflowers abound. Why do these plants flourish where there used to be a forest?

3. Why will shrubs (low growing bushes) grow before trees?

4. For a time, the major plants in Yellowstone will be yellow pines, which will ultimately be replaced by Lodgepole pines (so named because they were very straight and used to build lodges or houses).
   What does this tell you about yellow pines and lodgepole pines? **EXPLAIN!!**

5. Once lodgepole pines are established, the forests of Yellowstone Park will not change radically again. What is the term for the lodgepole pine community.

6. a. Elk, large herbivores, that live in the area eat mainly grasses. In winter, they eat twigs and needles from the small trees and shrubs. EXPLAIN what may happen to the elk population during the FIRST 10 years after the fire.

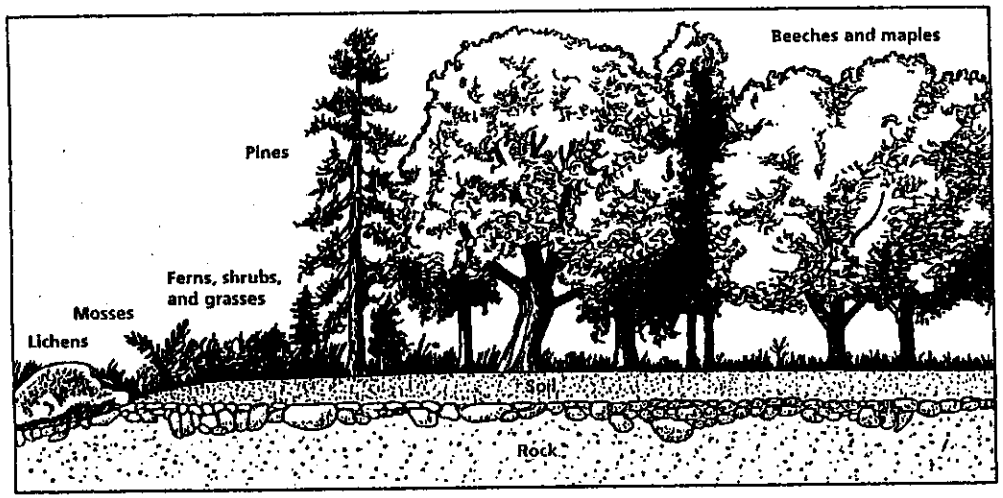
   b. What may happen to the elk population during the following 15 years.

Name _____

Primary Succession

1. What do ecologists mean by the term ***succession***?

2. Explain the process of ***primary succession*** as illustrated in the picture.



3. What is a ***climax community***, and which organisms in the picture represent this type of community?

4. How is ***secondary succession*** different from ***primary succession***?

5. Based on the picture, if you hiked through a patch of land that contained a pine forest into an area that contained only ferns, shrubs, and grasses, would you be moving from an older to a younger community or vice versa? **EXPLAIN!!**

6. Which parts of the ecosystem had to be established before the primary succession shown in the picture could occur?

M19

Chapter 3: Communities and Biomes

3.1 Communities

Pages: 67-71

Living in a Community

Main Idea

Supporting Detail			

Limiting factors -

Succession Over Time

Main Idea

Supporting Detail			

Name _____

Succession -

Primary Succession -

Climax Community -

Secondary Succession -

Section Review Questions 1-5

1. Give an example of a limiting factor for a pine tree.

2. Some species of fish can survive in both fresh and salt water. What does this say about their range of tolerance?

3. Give an example of secondary succession. Include plants and animals in your example.

4. Give an abiotic factor, and explain how it could be a limiting factor for a coyote population.

5. Explain how the growth of one population can bring about the disappearance of another population during succession.

M20

Chapter 4: Population Biology 4.1 Population Dynamics

Population Dynamics Pg 95-103

Main Idea

Supporting Detail			

Exponential Growth:

Carrying Capacity:

Density Dependent Factors:

Density Independent Factors:

Organism interactions limit population size.

Main Idea

Supporting Detail			

Section Assessment 1-5

1. How are graphs of exponential growth and linear growth different?

2. Explain how short and long life-history patterns differ.

3. Describe how density-dependent and density independent factors regulate population growth.

4. How can a density-independent factor, such as a flood, influence carrying capacity.

5. An organic farmer does not use pesticides on her farm. Instead of growing one crop on her farm, as many farmers do, she grows 10 different crops. Explain how this may decrease insect damage to her plants.

Name _____

4.2 Human Population Growth

Demographic Trends Pg 104-107

Main Idea

Supporting Detail			

Demography

Age structure

Immigration

Emigration

Section Assessment 1-5

1. What characteristics of populations do demographers study?

2. How does life expectancy affect death rate?

3. What clues can an age structure graph provide about a country's population?

4. Discuss some possible problems for local population caused by immigration and emigrant of people.

5. Using the gage structure graph for the United States in Figure 4.11, explain which gender has a higher life expectancy and then suggest a hypothesis for why this difference exists.

12N

5.1 Vanishing Species Pg 114-124

Name _____

Biodiversity

Main Idea

Supporting Detail			

Biodiversity

Importance of Biodiversity

Main Idea

Supporting Detail			

Loss of Biodiversity

Main Idea

Supporting Detail			

Extinction:

Threatened Species:

Threats to Biodiversity

Main Idea

Supporting Detail			

Exotic species:

Section Assessment 1-5

1. What are two causes for a species to become threatened or endangered?

2. How does acid precipitation kill trees?

3. What is an edge effect?

4. How do exotic species affect populations of native species?

5. Suggest reasons why warm tropical areas have more biodiversity than cooler areas.

M22

An Aquatic Ecosystem

Materials

1995 Water Sample
1996 Water Sample
1997 Water Sample
Algae Biomass Chart
Scoop
Nitrate Test Solution
Paper Towels
Well Tray
Oxygen Testing Powder
Water Bottle

Directions

Read and follow the steps in the order given. Record all observations, results, and answers to the questions as directed. Make your answers as complete as possible to demonstrate fully your knowledge of scientific principles and how to apply them.

STATEMENT OF TASK

Lakes may contain complex communities of living things. Phytoplankton (such as algae) aquatic plants, zooplankton (small water animals), frogs, fish, birds, mammals ad insects all interact in and around lakes. When pollutants such as sewage, fertilizer, or factory wastes enter the water, they can have an impact on the organism living in the lake.

A group of citizens is concerned about the local lakes. Lately, fish have been dying, the water has appeared cloudy and green, the lake has a distinct odor. Your task will be to collect and examine data from water samples collected from the lake over a three-year period. Based on the information, you will evaluate a proposed solution to the problem with the lake. You will consider the following in you investigation by conducting simulated testes and evaluating data

Note: Make our answers as COMPLETE AS POSSIBLE. Give detailed explanations using your observations, our knowledge of science, and specific examples from your data.

LAKE WATER SAMPLE TEST RESULTS

		1995 Water Samples	1996 Water Samples	1997 Water Samples
Nitrate Test Observations	Color			
	Mg/L			
Algae Test Observations				
Oxygen Test Observations				

M23

Name _____

PART 1: TESTING FOR NITROGEN AS NITRATE

In lakes, nitrogen is an important nutrient for photosynthetic organisms such as algae and plants. If there is not enough nitrogen, the organism will not be able to grow and reproduce. The most common source of nitrogen is nitrates which are found in fertilizers.

1. a. To test for nitrogen, use ONE drop of the 1995 water sample, ONE drop of the nitrate test solution, the well tray, and the nitrate color chart below

Nitrate Color Chart

Colorless	Red	Orange
Below 0.1 mg/L	0.1 - 10 mg/L	More than 10 mg/L

b. Record your data in Table 1.

c. Repeat steps a and b for the 1996 and 1997 water samples in separate wells.

PART II: DETERMINING BIOMASS OF ALGAE

Water that has algae growing in it will appear green. The "biomass" (the dry weight of algae in a given volume) can be estimated by comparing water samples to a color chart.

2. a. To estimate the biomass for algae, use the 1995 water sample and the Algae Biomass Chart provided in your kit. Hold the bottle up to the chart and compare the color of the water sample in the bottle to the colors on the chart.

b. Record your data in Table 1: lake Water Sample Test Results

c. Repeat steps a and b for the 1996 and 1997 water samples.

d. **Graph this data on Figure 3** in the section labeled "producers (Algae)"1995, 1996, 1997.

Figure 3: Comparing the Biomass of Producers and Decomposers in the Lake