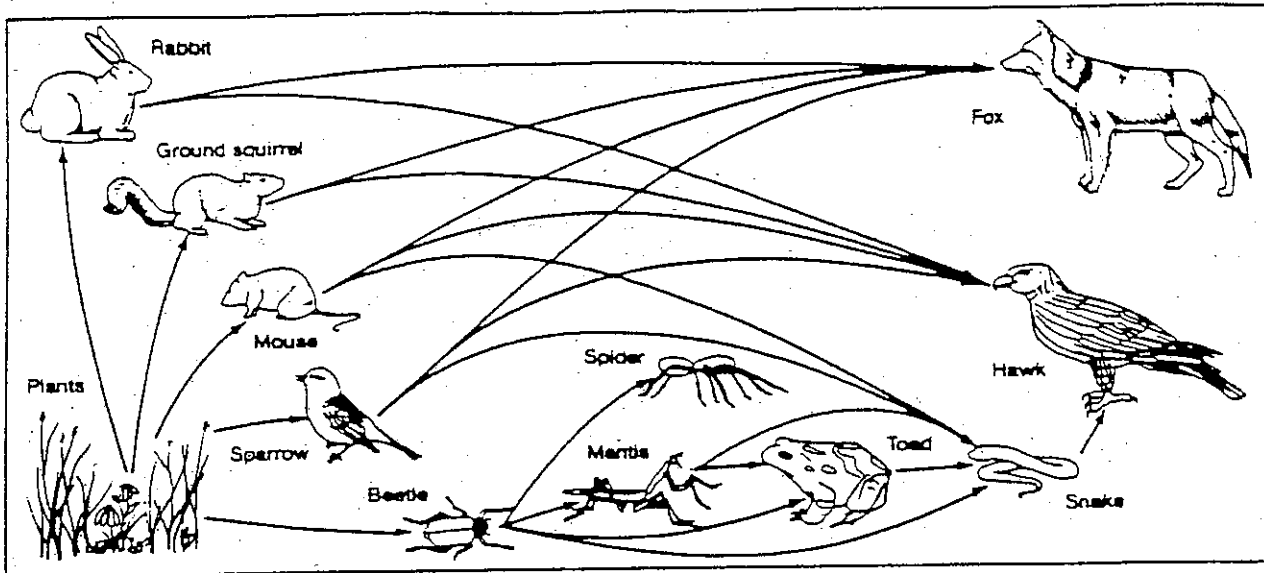


**Biology Honors Ecology/Environmental Science Unit
Ecology Worksheet Packet**

Ecology Food Chain Activity



1. The organisms in this diagram form a _____
2. What are the producers in the diagram? _____
3. What are the secondary consumers in the diagram? _____
4. The diagram includes producers and consumers. What major group of organisms is **not** shown?

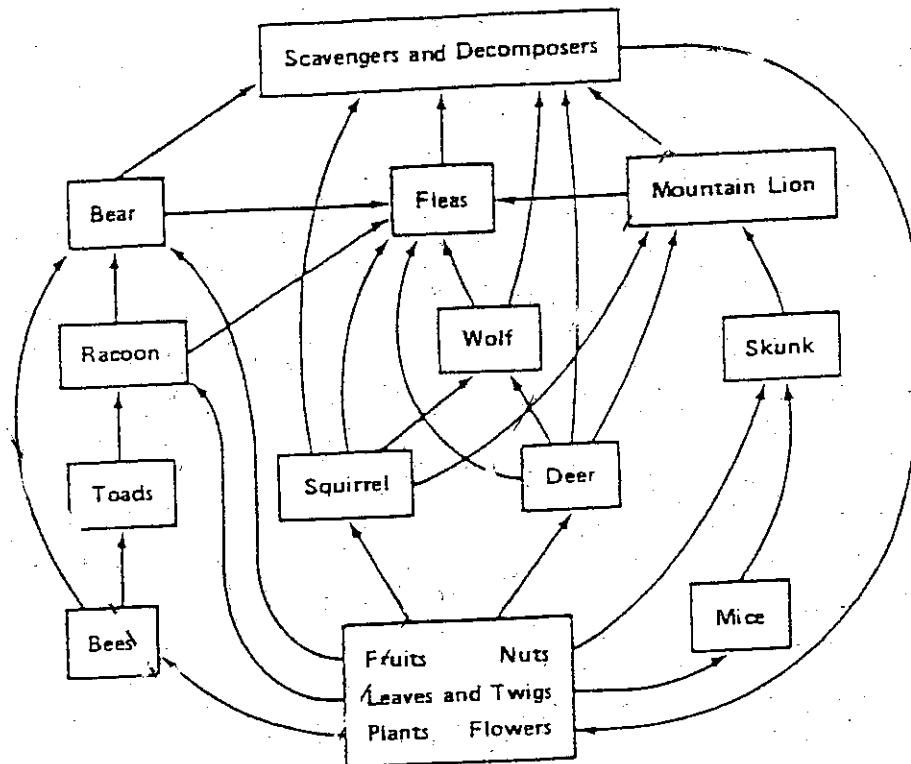
5. The removal of which organisms would result in the complete collapse of the ecosystem?

6. Pick 3 organisms from the diagram, and explain how they depend on one another.

7. Consider a food chain of corn → mice → fox.
One of the most important jobs that ecologists have to do is predicting the effects of disturbances on ecosystems. What will happen to the mice in this food chain if a farmer decides to eradicate (kill off) the fox population?

Following this, what will the effect be on the corn?

The next 10 items refer to the diagram below.



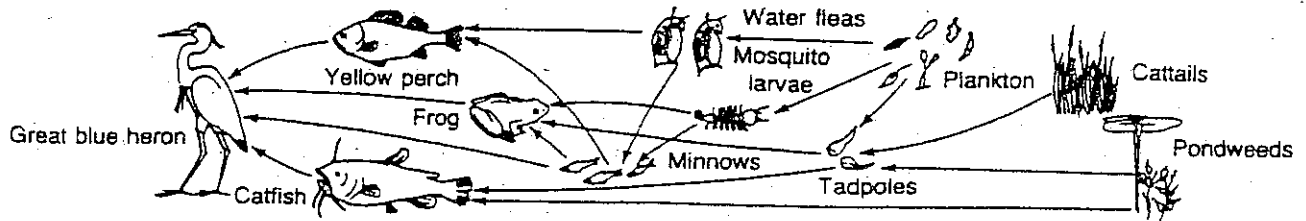
True or False

1. In this food web raccoons are producers.
2. Bears feed on material which comes indirectly from fruits and blossoms.
3. If deer hunting were stopped for one season, the wolf population would tend to increase.

4. Deer are first-order consumers.
5. Bears can be classified as first, second, and third-order consumers.

ENERGY FLOW IN ECOSYSTEMS

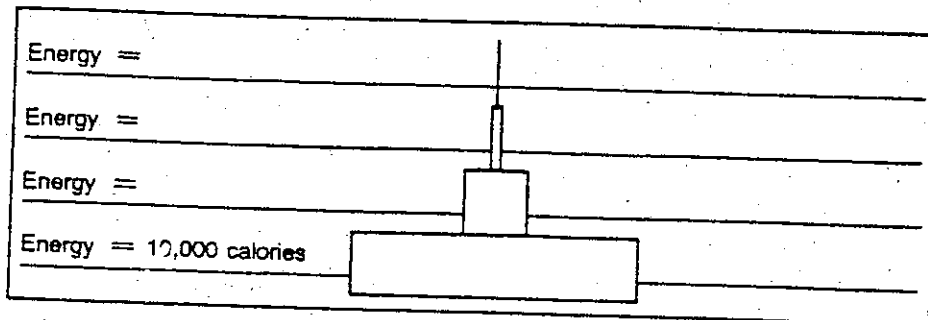
Study the diagram below, which illustrates a food web in a pond. Then complete the following table by listing the organisms that occupy each energy level. Some organisms will appear on more than one level because they are part of more than one food chain.



Producers	
First-order consumers	
Second-order consumers	
Third-order consumers	
Fourth-order consumers	

CRITICAL THINKING: ENERGY PYRAMIDS

An energy pyramid represents the transfer of energy in a food chain. The pyramid illustrates the loss of energy sustained in each transfer. The diagram illustrates the energy pyramid for an ecosystem. Complete the listing of energy values and supply the correct name for the types of organisms found at each level.



Ecology**Relationships between organisms**

1. Match each name of a relationship between organisms with its correct description:

- | | |
|--------------------|---|
| _____ Predation | A. The organisms are rivals for resources. |
| _____ Mutualism | B. One organism derives benefit, the other is unaffected. |
| _____ Commensalism | C. One organism derives benefit at the other's expense. |
| _____ Parasitism | D. One organism preys on another. |
| _____ Competition | E. Both organisms gain some advantage from the interaction. |

2. When 2 organisms interact closely, this is called _____

3. Classify each of the following relationships into one of the 5 types described in Question 1:

(a) Clown fish are not affected by the stinging cells of sea anemones. They live very close to the anemones, darting in among the tentacles when danger threatens.

(b) Cattle have complex stomachs which support populations of protists and bacteria that can synthesize a substance cattle cannot produce. The substance (called an *enzyme*) helps the cattle digest plant material.

(c) Foxes feed on mice and rabbits; in doing so they remove the less healthy animals from the mice and rabbit populations and keep their numbers in check.

(d) Ticks live by sucking the blood of mammals.

(e) Viruses infect and live within cells of different organisms; in this way they can produce disease.

Ecology Review Sheet

Match the letter of the term or phrase on the right with the phrases on the left (some of the lettered terms on the right will not be used).

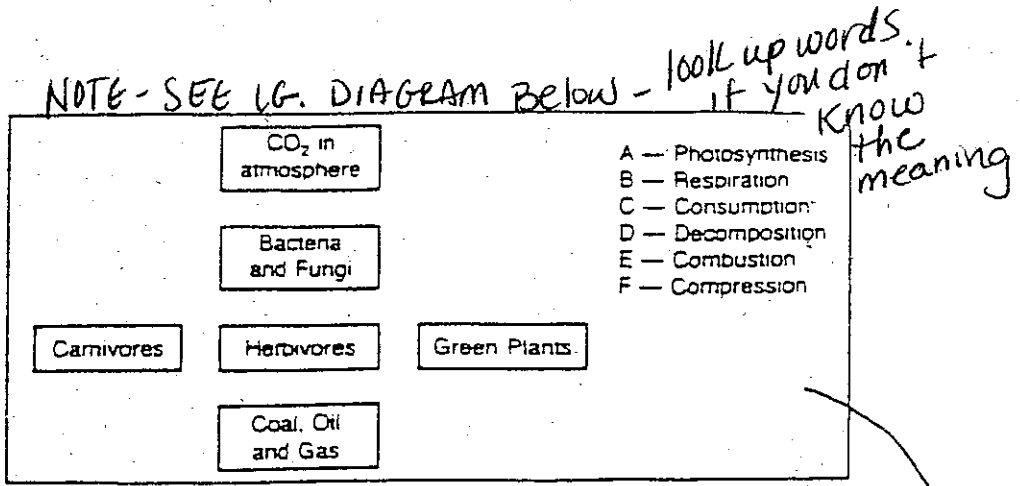
- | | |
|---|-----------------------|
| <p>___ 1. Green plants that undergo photosynthesis</p> | A. food web |
| <p>___ 2. Feeds directly on the producer</p> | B. herbivore |
| <p>___ 3. Feeds on a primary consumer</p> | C. primary consumer |
| <p>___ 4. Living things</p> | D. abiotic |
| <p>___ 5. Water, light, temperature, sand, rocks;
physical factors that affect living things</p> | E. ecosystem |
| <p>___ 6. When an organism feeds on and lives in a
host, causing harm to the host</p> | F. parasitism |
| <p>___ 7. Symbiotic relationship where 2 organisms
benefit one another</p> | G. producer |
| <p>___ 8. Symbiotic relationship where one or more
organisms benefit, and others are not harmed</p> | H. scavengers |
| <p>___ 9. A group of interconnecting food chains</p> | I. commensalism |
| <p>___ 10. Source of energy that producers convert
to chemical energy in photosynthesis</p> | J. secondary consumer |
| <p>___ 11. Water lilies → snails → ducks</p> | K. sun |
| <p>___ 12. Interaction of living things with their nonliving
environment. Ex. pond, ocean, forest</p> | L. carnivore |
| <p>___ 13. A group of organisms living together in an area</p> | M. biotic |
| <p>___ 14. Decays dead organisms and returns minerals to
the ecosystem</p> | N. mutualism |
| <p>___ 15. Consumers that feed only on plants.
Ex. rabbit</p> | O. food chain |
| <p>___ 16. Consumers that eat plants and meat. Ex. humans</p> | P. decomposers |
| | Q. omnivore |
| | R. pyramid of energy |
| | S. community |
| | T. organisms |

CARBON CYCLE

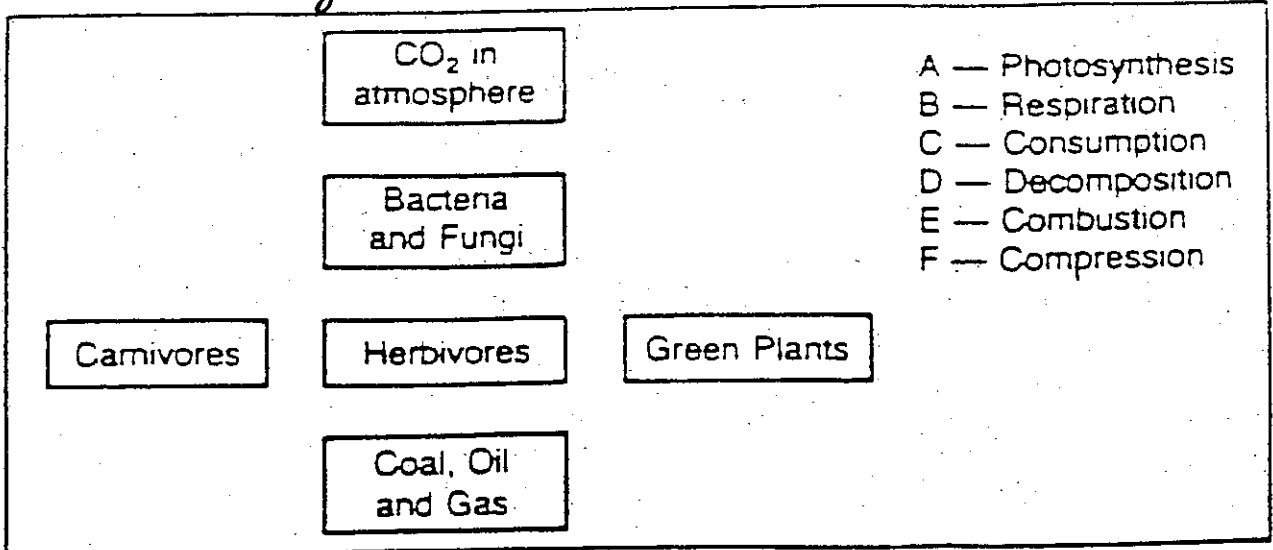
Carbon is vital to all organisms and is continuously supplied through the action of a natural cycle. During this cycle, carbon is found in various chemical compounds. It ultimately becomes available to organisms in the proper chemical form. Complete

the diagram on the right by adding the appropriate arrows and labeling each arrow according to the key at the right of the diagram. Then fill in the blanks in the paragraph that follows, which describes the carbon cycle.

Carbon _____ is taken from the atmosphere by _____, which convert it to complex organic molecules by the process of _____. During _____, these molecules are broken down and _____ is released into the _____. Carbon is also returned to the atmosphere when _____ break down _____, dead plants, and animals. If organic carbon compounds are not broken down, they may become compressed and converted into _____. The _____ of these fossil fuels releases carbon into the atmosphere.



We'll fill ⁱⁿ the following ^{flow} chart during class.



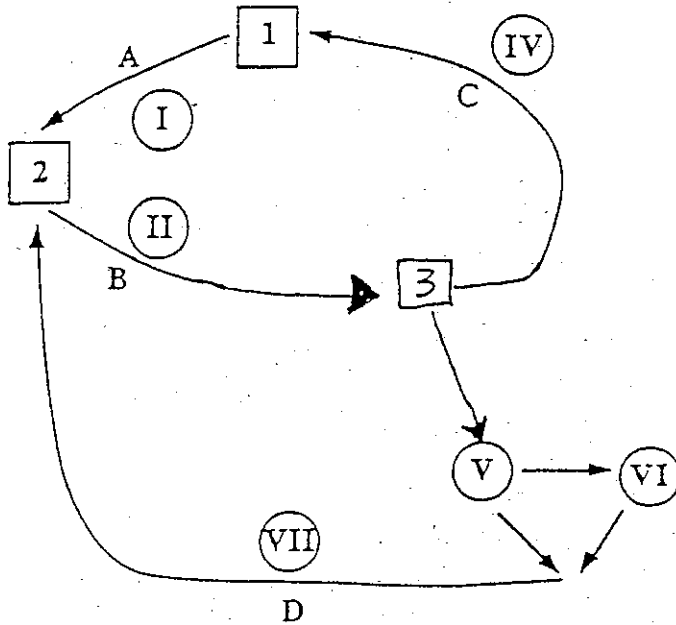
If you don't know what Compression & Combustion are - look them up.

NAME _____

THE NITROGEN CYCLE

Match the lettered items in the illustration of the nitrogen cycle with the items below.
Circles represent organisms; squares represent substances; and letters represent processes

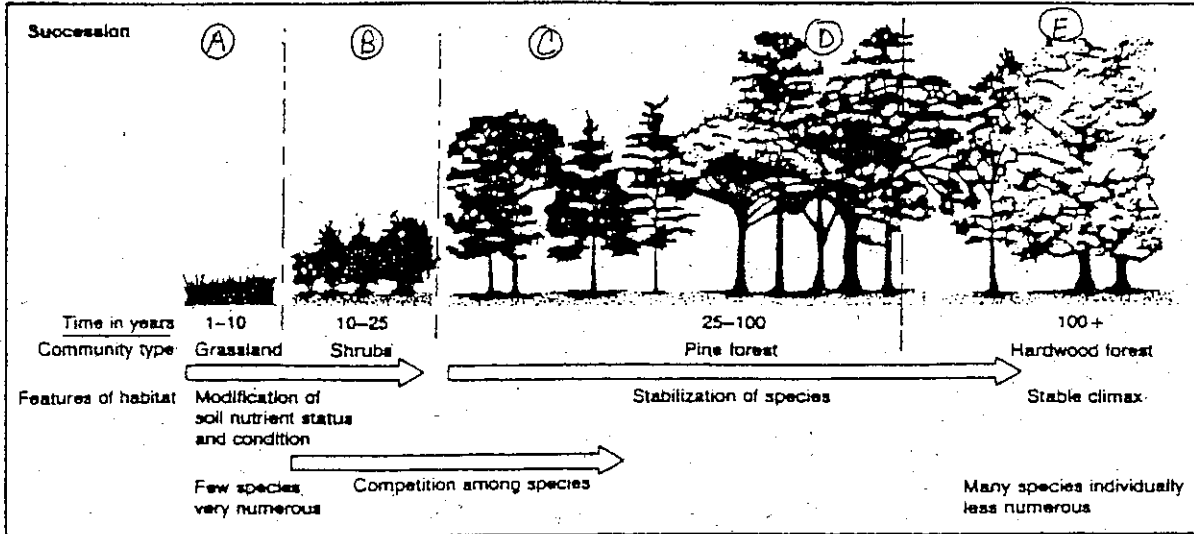
NOTE: Square #1 represents nitrogen gas (N_2)



1. Denitrification.
A. A B. B C. C D. D
2. Plants.
A. I B. II C. III D. IV E. V A.B. VI A.C. VII
3. Nitrates.
A. 1 B. 2 C. 3 D. 4 E. 5
4. Ammonification.
A. A B. B C. C D. D
5. Bacteria *(choose more than 1 answer)*
A. I B. II C. III D. IV E. V A.B. VI A.C. VII
6. Ammonia.
A. 1 B. 2 C. 3 D. 4 E. 5
7. Nitritification.
A. A B. B C. C D. D E. E
8. **ANIMALS**
A. I B. II C. IV D. V E. VI A.B. VII
9. Nitrogen fixation.
A. A B. B C. C D. D
10. Nitrogen gas (N_2)
A. 1 B. 2 C. 3 D. 4 E. 5

Succession Worksheet

Communities can appear and disappear during a succession of changes in an ecosystem. Study the diagram below which illustrates what happened to the land on an abandoned farm in the southeastern United States over a period of 100 years.



1. The first organisms to colonize an area are called _____.

These include (*many, few*) _____ different species. The kinds of species in Stage A produce (*many, few*) _____ seeds, and grow (*slowly, quickly*) _____.

During the second Stage B, different species begin to grow, such as _____.

There is (*more, less*) _____ competition between species during the second stage than during the first.

The first 25 years after the farm was abandoned, the soil continued to change, to become (*more, less*) _____ fertile, and able to support (*more, fewer*) _____ species. After 25 years, the species in the area became (*more, less*) _____ stable, and a (*pine, hardwood/deciduous*) _____ forest developed. Gradually, the *pine, hardwood/deciduous* _____ forest crowded out the other one. When compared with stage A, stage E has (*more, fewer*) _____ species. Stage E also has (*more, fewer*) _____ individuals of a species than Stage A. Stage E is called _____ and is a (*stable, changing*) _____ community. The type of succession that took place after the farm was abandoned is known as (*primary, secondary*) _____ succession.

2. List 2 differences between this type of succession, and the other type of succession.

3. Order the stages in the primary succession in a natural forest community in New England from earliest (1) to latest (6):

- _____ Pine Trees begin to grow in direct sunlight.
- _____ Ferns, grasses, and shrubs appear.
- _____ Primitive soil forms as decomposers breakdown dead pioneer organisms.
- _____ Mosses anchor in the soil.
- _____ Beeches and maples become the dominant species.
- _____ Organisms such as lichens begin to grow on bare rock.

4. What limiting factors keep grasses from being present in the climax community?
(a *limiting factor* is a resource that, if present in short supply, will limit the growth or reproduction of those organisms in a community)

5. What limiting factors keep oak trees from being present in the pioneer community?

Growth of Populations

Population growth can be shown with a J-shaped curve or an S-shaped curve. Answer each of the following questions by identifying the curve described as J-shaped or S-shaped.

1. Which curve shows that a population has stopped increasing in size? _____
2. Which curve shows that the size of a population will increase indefinitely? _____
3. Which curve shows a population's growth under ideal conditions? _____
4. Which curve shows the growth of a rabbit population living in a forest? _____
5. Which curve shows a population's biotic potential? _____

Suppose that the table below represents information about the growth of a particular bee population. Use the information in the table to answer the questions that follow.

Population Age in weeks	Number of Bees	Increase in Number of bees
1	1000	
4	4000	3000
7	24 000	20 000
10	46 000	22 000
13	70 000	24 000
16	80 000	10 000
19	80 000	0

6. During which two 3-week periods was the increase in the bee population the greatest? _____
7. At what stage of the bee population was the growth the slowest? _____
8. What kind of curve (J or S) would the growth shown in this table make? _____

