Freshman Biology: Biosphere Exam Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I. Multiple choice: For each question, circle the answer the best completes the question.

1. Ecology is the science that studies the:

A. evolution of life

B. how the earth works

C. relationships between organisms and their environment

D. the environment in the absence of human

2. Which of the following is NOT an abiotic factor?

A. Air

B. Water

C. Decomposers

D. Temperature

3. Which of the following encompasses all of the others (HINT: which one is the “highest” level)?

A. Ecosystem

B. Community

C. Population

D. Species

4. Which of the following best explains why there are usually no more than five trophic levels in a food chain?

A. There are not enough organisms to fill more than five levels

B. There is too much competition among the organisms at the lower levels to support more animals at higher levels.

C. The statement is not true; there can be unlimited trophic levels

D. Energy is lost during each trophic level

5. Deer share the open plains with other grazing animals and predators. Which of the following would lead to a decrease in the deer population?

A. Reduction in the predator population

B. Increase in the number of other grazing animals

C. Reduction in the grazing animal population

D. Increase in restrictions on the hunting of deer

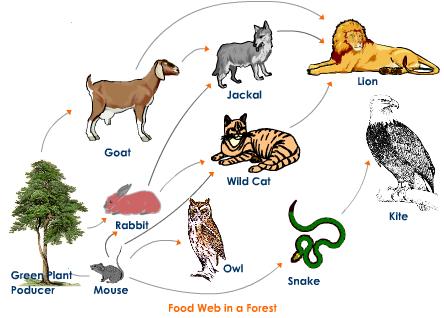
6. In the carbon cycle, carbon is transferred from animals to plants by which of the following?

A. Carbon dioxide

B. Oxygen

C. Sugars

D. Water

Use the diagram of the food web to answer questions 7-9.

7. If these organisms were arranged in a food pyramid, which organism would have the least amount of total energy available?

A. jackal

B. lion

C. mouse

D. tree

8. Which population would increase most if the mouse were eliminated?

A. owl

B. wild cat

C. autotrophs

D. primary consumers

9. Which of the following populations begins the flow of energy through the food web?

A. snake

B. mouse

C. tree

D. kite

**II. True/False:** Write TRUE or FALSE on the line (Do not use T or F!)

1. True\_\_\_\_ Matter flows throughout the biosphere in a cyclical manner
2. False\_\_\_\_ Both autotrophs and heterotrophs can convert solar energy in usable energy
3. True\_\_\_ Nitrogen can exist in all three states of matter: solid, liquid, and gas
4. True\_\_\_\_ Communities consist of both abiotic and biotic factors

**III. Short Answer:**

The water cycle is a biogeochemical cycle that exists within the biosphere. All living things require water to survive.

1. In your own words, define the following terms:

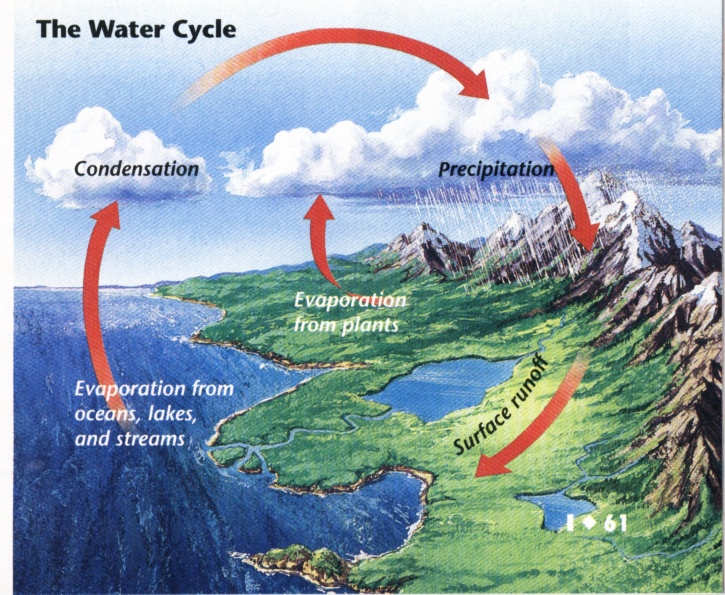
Evaporation: Process by which water changes from liquid form to atmospheric gas

Transpiration: Process by which water from plants changes from liquid to atmospheric gas

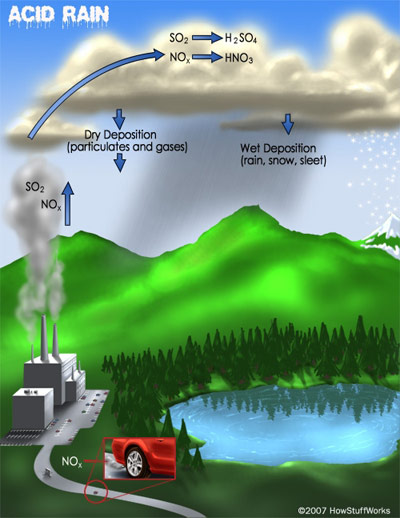
Condensation: Process by which atmospheric gas condenses to form clouds

Precipitation: Process by which atmospheric becomes dense enough to form liquid/solid & fall due to gravity

1. Using the terms above, illustrate the water cycle in the space below. Show how water moves between the ocean, atmosphere, and land.



1. Describe the environmental effects that a smoke factory may have in the water cycle.

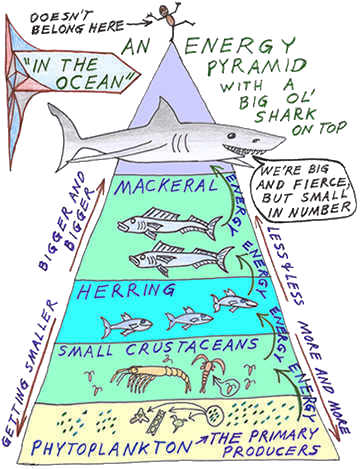
* Pollution: Sulfur Dioxide, Nitrogen Oxides
* Combines with moisture in atmosphere; condensation
* Acid rain precipitate
* Stream run-off is acidic
* Lethal to fish species
* Lethal to certain plant species
* Damages the food chain
* Damages trophic levels

1. Propose a plan as to how YOU can contribute to solving an environmental issue regarding the water cycle. Write a brief outline including:

* The water cycle issue that you wish to help solve
* An overall objective
* 3 solutions
* 3 methods to achieve solutions

**IV. Labeling/Calculations:**

Label the diagram below. On the left side, label the five trophic levels (HINT: first level is given). On the right side, calculate the amount of individuals at each level given that there are **100 mackeral.**

 Trophic Level # of individuals per trophic level

10 sharks

Quaternary consumers (carnivores)

100 mackeral

Tertiary consumers (carnivores)

Secondary consumers (carnivores) 1000 herring

Primary Consumers (herbivores) 10,000 small crustacean

Primary Producers (autotrophs) 100,000 phytoplankton

**Part V: Essay**

You have recently been hired by the Illinois Wildlife state government. One of your first assignments is to give high school students a tour of the Illinois wetland preserve. Unfortunately the tour has been canceled due to rain- however the instructor still wants know “what would have happened”. Write the instructor a letter containing the following components:

* Examples of the 6 levels of organization at the preserve
* The characteristics of each level
* How each level is related to another with examples
* 6 levels:

Species: a group of organisms so similar to one another that they can breed and produce fertile offspring. Example: Ant

Populations: groups of individuals that belong to the same species that live in the same area. Example: Ant hill

Community: assemblages of different populations that live together in a defined area. Example: all of the ant hills in the Illinois wetland preserve

Ecosystem: a collection of all the organisms that live in a particular place together with their nonliving or physical environment. Example: the Illinois wetland itself

Biome: group of ecosystems that have the same climate and similar dominant communities. Example: Grasslands

Biosphere: the combined portions of the planet in which all life exists. It includes land, water, and air. Example: earth