UNIT 5: ECOLOGY
Chapter 13: The Principles of Ecology

I. Ecologists Study Relationships (13.1)

A. Ecologists study environments at different levels of ___________________.

1. Ecology- study of the interactions among living things and their surrounding. Name comes from Greek work “oikos”- meaning “________________”.

2. Levels of organization- biologist study nature on different levels, from a __________ to a __________ scale
   a. ______________ - a individual living thing
   b. ______________ - group of same species that lives in one area
   c. ______________ - group of different species that live together in one area
   d. ______________ includes all organisms as well as the climate, soil, water, rocks, and other non-living things in a given area.
   e. __________ - major regional or global community of organisms characterized by climate conditions and plant communities that thrive there.

B. Ecological research methods include observations, experimentation, and modeling

1. ______________ - the act of carefully watching something over time.
   a. May be ______ term or ______ term studies
   b. ______________ are used to monitor and observe populations

2. Experimentation- may perform experiments in the _______ or in the __________
   a. lab experiments give researcher more control, but artificial setting does not reflect complex __________ that occur in __________.
   b. field experiments gives more accurate picture but is more difficult because of numerous __________ at work in __________.
c. **Modeling** - use of ______________ or mathematical ____________ to describe and model nature based on real data.

1). Can see how one _____________ affects another

2). Can create **virtual** ________________

II. Biotic and Abiotic Factors (13.2)

A. An ecosystem includes both biotic and abiotic factors

1. **Biotic** - includes _____________ things

2. **Abiotic** - includes ______________ things such as moisture, temperature, wind, sunlight, and soil

B. Changing one factor in an ______________ can affect many other factors

1. **Biodiversity** - the assortment, or ___________, of living things in an ecosystem

   a. amount depends on many factors

   b. **tropical rainforests** have ________ biodiversity

2. _____________ **species** - a species that has an unusually ____________ effect on its ecosystem

   a. loss of this species may cause ____________ effect felt across entire ________________

   b. Example- **beaver** changes habitat for many other species by creating ____________

III. Energy in Ecosystems (13.3)

A. ______________ provide energy for other organisms in an ecosystem

1. **Producer** (______________) - get their energy from nonliving resources (make their own food)

2. **Consumer** (__________________) - get their energy by eating other living things such as plants and animals

B. Almost all producers obtain energy from ______________
1. Most producers on Earth use sunlight as energy source using ____________________.

2. photosynthesis converts light energy (__________) into chemical energy (__________________)

C. _____________________ - organisms make carbohydrates using chemicals instead of sunlight

1. Found in _____-______ thermal vents and sulfur-rich marsh flats and hydrothermal pools

2. can be __________ for thriving ecosystems

IV. Food Chains and Food Webs (13.4)

A. Food chain- sequence that links species by their ______________ relationships.

1. only follows connections between one ____________ and single ______________ of consumers

2. simplest way to look at _______ flow in an ecosystem

B. Types of consumers

1. Herbivores- eat only __________

2. Carnivores- eat only ____________

3. Omnivores- eat both _______ and __________

4. Detritivores- organisms that eat detritus (___________ organic matter)

5. Decomposers- _______ ________ organic matter into simpler compounds

   a. _____________ and bacteria

   b. Important to stability of ecosystem by returning ________________ back into the environment

6. Organism may focus on single organism to feed (______________), or have varying diet (generalist)

C. _____________ levels- level in a food chain

1. ________________ always first level

2. Primary consumers next level (______________)
3. _____________ consumer - eat herbivores (carnivore)

4. _____________ consumer - carnivores that eat secondary consumers.

D. A _food_ _______ shows a complex network of feeding relationships

1. _Food web_ - organism may have __________ feeding relationships.

2. Stability of food web depends on presence of _______________ (forms base of food web)

V. Cycling of Matter (13.5)

A. Water cycles through the environment

1. _Hydrologic cycle (water cycle)_ - circular pathway of _____________ on Earth

2. Flows from atmosphere to the surface, below ground and back and involves humans and other organisms.

B. Elements essential for life also _____ through ecosystems

1. _biogeochemical cycles_ - movement of a particular _____________ through biological and geological parts of an ecosystem

   a. __________ cycle - cycle of photosynthesis and cellular respiration

   b. __________ cycle - flow of carbon through environment

1). _Carbon_ essential for __________ compounds (carbohydrates, proteins, fats, etc.)

2). Simplest transfer occurs between __________ and ___________ (photosynthesis and cellular respiration)
c. ______________ cycle - conversion of nitrogen gas in atmosphere into compounds that living things can utilize

1). Nitrogen ______________ - converting ____________ nitrogen into ammonia (NH₃) (used by certain bacteria)

2). Denitrifying ______________ - convert nitrogen compounds back to nitrogen ______

d. Phosphorus cycle - returns phosphorus to environment (phosphorus is ____________ factor for plant growth)

VI. Pyramid Models (13.6)

A. An energy pyramid shows the distribution of __________ among ____________ levels

1. Ecosystems get energy from ______________

2. Some energy is ______ along the way as ________

B. Loss of available energy

1. energy used for many purposes such as movement and ______________.

2. Your body very ______________ at converting food into useful energy

3. Unused material excreted as ____________

4. ______________ - measure of total dry mass of organisms in given area

   a. When consumer eats producer great deal of energy lost in process as ______ and waste

   b. Only ____% of energy is transferred at each trophic level

C. Energy Pyramid - diagram that compares energy used by each ____________ level

1. Base made up of ______________

2. Energy _____ to each succeeding trophic level
D. Other pyramid models illustrate an ecosystem’s biomass and distribution of organisms

1. **pyramid** - diagram comparing biomass of different trophic levels within an ecosystem

2. **Pyramid of** - shows the numbers of individual organisms

3. Both types of pyramids may occur in an **increasing**, or **decreasing** down, formation (E.g. pyramid of numbers based on single tree)