Ecological Organization

- Ecology
  - relationships between ____________________ and their ____________________
- Biosphere
  - the portion of earth where ____________________ exists

Characteristics of Ecosystems

- Requirements
  - Constant flow of ____________________ from the ____________________
  - Cycle of materials
- Abiotic Factors of Ecosystems (nonliving)
  - Light, ____________________, water, soil, gases, ________________
  - Also called ____________________ factors
- Biotic Factors of Ecosystems (living)
  - Trees, ____________________, fungi, ____________________

Species

- Organisms that look alike and can ________________ among themselves.

Population

- all members of a ____________________ living in a particular location

Community

- interacting ____________________ (white tail deer, maple trees, coral reef, etc.)

Ecosystem

- members of a ____________________ and their physical environment
- The organisms plus:
  - 
  - 
  - 

How does a community differ from a population? An ecosystem?
Habitat vs. Niche

- Habitat
  - ________________ in which an organism lives

- Niche
  - the _____________ a species fills in its habitat (what it ______, where it lives)

Natural Selection

- A characteristic that makes an individual better ________________ to its environment may eventually become common in that species through a process called ________________

- Natural selection results in ________________, the ________________ and ________________ characteristics that allow organisms to live successfully in their environment.

Niche

- Every organism has a variety of ________________ that are suited to its specific living conditions.

- A ________________ is the role of an organism in its habitat, or how it makes its living.

- A niche includes:
  - Type of ________________ the organism eats
  - How it ________________ its food
  - _______ the organism for food

Competition

- There are three major types of interactions among organisms:

  1. ________________
  2. ________________
  3. ________________

Competition

- Different species can ________________ the same habitat and food requirements.

- ________________ is the struggle between organisms to ________________ as they attempt to use the same ________________ resource.

- In any ecosystem, there is a limited amount of ________________, ________________ and shelter.

- Organisms that survive have ________________ that enable them to reduce competition.
Predation

- ___________________________ is an interaction in which one organism kills another for food.
- The organism that does the killing for food is the ___________________________.
- The organisms that is killed for food is the ___________________________.

Predator-Prey competition relationships help maintain stability within an ecosystem.

BUT...if a prey population decreases or is eliminated, predator population decreases.

<table>
<thead>
<tr>
<th>Prey population</th>
<th>Predator population</th>
</tr>
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</table>

Likewise, if a prey population increases, predator population increases.

<table>
<thead>
<tr>
<th>Prey population</th>
<th>Predator population</th>
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<tbody>
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<td></td>
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</tbody>
</table>

Symbiosis

- ___________________________ – is a close relationship between two species that benefits at least one of the species.

- There are three types of symbiotic relationships:
  1. ___________________________
  2. ___________________________
  3. ___________________________

Survival Relationships

- A....Mutualism-a ___________________________ relationship in which ________________ species benefit ex ants and ________________ trees. ________________ protect the acadia tree by attacking any animal that tries to feed on tree, tree provides nectar and home for ants.

- B.... Commensalism-symbiotic relationship in which one species is neither ___________________________ or benefited. Ex orchids, ferns, mosses can ________________ on branches of trees and benefit but tree not harmed or benefited

- C... Parasitism-interactions in which a member of one species ___________________________ at the expense of another. Ex. ___________________________ on dog, bacteria host
Mutualism

- **Mutualism** – A relationship in which __________________ species ____________________.
  - Example:
    - The relationship between the Saguaro Cactus and Long Eared Bats.
      - Cactus flowers provide bats with __________________
      - The cactus benefits because the bats carry __________________ from cactus to cactus on their noses.

Mutualism—You scratch my back I scratch yours

- Clownfish and sea anemones present an example of __________________ _________________________. The clownfish benefits by having a protected home territory. What does the sea anemone gain from this arrangement?
- One example of a mutualistic relationship is that of the ____________________________ (a kind of bird) and the ___________________________ or ___________________________. Oxpeckers land on rhinos or zebras and _______________ ticks and other parasites that live on their skin. The oxpeckers get food and the beasts get _______________ control.
- Aphids and ants. The aphids secrete a sugary solution called _____________________________. Ants drink the honeydew and, in return, they _____________________________ the aphids from predators.

Mutualism

- Lichens – algae And fungi
- A remarkable 3-way mutualism appears to have evolved between an ____________, a ________________ caterpillar, and an ________________ in the American southwest. The caterpillars have ________________ organs which the ants ________________ from, and the acacia tolerates the feeding caterpillars. The ants appear to provide some ________________ for both plant and caterpillar.

Commensalism

- **Commensalism** – Is a relationship in which one species __________________ and the other species is neither helped nor harmed.
  - Example –
    - The red-tailed hawks’ interaction with the saguaro cactus.
      - The hawks benefit by having a place to build their ____________________________.
      - The cactus is not ____________________________ by the hawks.
    - Commensalism is ____________________________ very common in nature because species are usually either helped or harmed a little by any interaction.
Commensalism- ______________ ________________

List the four examples—you do not need to go into detail.
* * * *

Commensalism

• Poison ______________ and trees
• ______________ and ________________
• ______________ and ________________

Parasitism

• **Parasitism** – involves one organism living on or inside another organism and ______________ it.
• The organism that benefits is called a ________________
• The organism that the parasite lives on or in is known as the ________________
• Common parasites are ________________, ticks and leeches.
• These parasites have ________________ that enable them to attach to their host and feed on their blood.
• Other parasites live inside the host’s body such as ________________, that live ________________ the digestive systems of dogs, wolves, and some other mammals.
• Unlike predators, a parasite does ________________ usually ________________ the organism it feeds on.

WHY IS THIS GOOD FOR THE PARASITE??????

Parasitism examples:
• ________________ and ________________
• ________________ and ________________

Zombie snails

What’s going on?

Complex Symbiotic Relationships

Fungus growing ants—what’s going on?

Parasitic wasps—what’s going on?
All 3

- **Parasitism** - GIVE ME TWO EXAMPLES (+, -)

- **Commensalism** – GIVE ME TWO EXAMPLES (+, 0)

- **Mutualism**- GIVE ME TWO EXAMPLES (+, +)

### Nutritional Relationships

- **Autotrophs**
  - make their ___________________________ food (plants)
  - Also called ______________________________

- **Heterotrophs**
  - eat ___________________________ and other organisms
  - Also called ______________________________
  - Examples are ____________________________, fungi, protists, and bacteria

- **Types of Heterotrophs:**
  - **Herbivores**
    - eat ___________________________
  - **Carnivores**
    - eat animals
      - Predators
        » ___________________________
      - Scavengers
        » feed on animals they ______________ ______________
  - **Omnivores**
    - eat ___________________________ and __________________________
Energy Flow Relationships

- **Producers**
  - __________________________ (autotrophs)

- **Consumers**
  - __________________________ (heterotrophs)
    - Primary – eat __________________________
    - Secondary – eat primary __________________________

- **Decomposers**
  - Break down __________________________ organisms
    - (____________________ and fungi)

- **Saprotrophs**
  - __________________________ dead or decaying material
  - Enzymes
  - Fungi, __________________________

- **Detritivore**
  - Eat __________________________ or __________________________ material
  - Earthworms, __________________________, insects

Energy Flow

- __________________________ = __________ ENERGY = SUNLIGHT = _____ RADIATION

- The __________________________ is the primary source of energy on earth

- Living systems require a __________________________ input of energy to maintain organization. The input of __________________________ energy which is converted to __________________________ energy allows organisms to carry out life processes.

Most Energy is Lost as Heat

- Within ecosystems energy __________________________ from the radiant energy of the sun through __________________________ and consumers as __________________________ energy that is ultimately transformed into __________________________ energy.

- Continual __________________________ of radiant energy is required by ____________.
Only _________ of Solar Energy is Utilized for _______________________

The rest is __________________________ by other sources or lost as ______________________

Energy Flow Relationships

• Food chains
  – transfer of ____________________________ in repeated stages

• Trophic Level
  – Feeding ____________________________ (producers, primary consumers, secondary consumers, etc.) of the food chain

Food Web

• Food ____________________________ interconnected

• Note that the arrows go in the ____________________________ of energy flow!!

PLAN YOUR OWN FOOD WEB – WHITEBOARD ACTIVITY!

Ecological Pyramids

• Pyramid of Energy
  – shows how energy ____________________________ from producers to ____________________________
  – There is a ____________________________ change level to level

Energy Pyramid - ____________________________ Rule

• Scientists estimate that only __________ of the sun’s energy is used in ____________________________ !!
• The energy that is obtained is only ________________ of the previous level’s energy.
Ecological Pyramids

- Pyramid of ______________________________
  - Shows population sizes and how they ____________________________ at each level
- Pyramid of ______________________________
  - ________________________________ found at each level
  - Producers at the ___________________________, high level consumers on top

WHICH LEVEL HAS THE GREATEST BIOMASS?

Ecosystem Formation

- Ecological ______________________________
  - Replacement of one ____________________________ by another
- Pioneer organisms
  - The ____________________________ organisms in an area (lichens, algae)
  - They make a more ____________________________ environment for other plants
  - ____________________________, algae, grass
- Climax community
  - The ____________________________ community
  - Remains until ____________________________ destroys

Forest Succession

Primary Succession- takes place where ____________________________ has existed before.

Secondary Succession – occurs where life has ____________________________ existed

Pioneer Species
Carrying Capacity vs. Exponential Growth **DRAW AND LABEL**

J-shaped curve  

S-shaped curve

**Carrying Capacity**

- The ___________________________ number of organisms of a particular type that can be ___________________________ in an area...

LET’S LABEL THIS!

Label the following parts of the graph: exponential growth; population overshoot; population decline; 4) population recovery and stabilization; and carrying capacity
Life History Patterns

- An organism’s _________________________________ pattern
  - Elephant’s – _______________________________ pattern
  - Mosquitoes – _______________________________ pattern

- What are some factors that would keep the population at a steady level?

- Competition
  - organisms struggling for _______________________________ resources

Certain limiting factors are related to population density (size)...

- Density-dependent factors (food, disease, predators)
  - These factors have an _____________________ effect as the population ____________________.

Certain limiting factors are NOT related to population density (size)...

- Density-independent factors (temperature, storms, floods, droughts)
  - These factors can affect _____________________, regardless of their ____________________.
Behavioral Adaptations

- As an organism develops special behaviors which are
  
  ________________ behavior (born with it---in the DNA) or
  
  ________________ behaviors and important for ________________.

Taxis (Innate)

- ________________ (Termites release pheromones for communication)
- ________________ (Plants response to light)
- ________________ TO LIGHT

Migration (innate)

The seasonal ____________________________ of a complete ____________________________ of animals from one area to another (IMMIGRATION vs EMMIGRATION)

Estivation / Hibernation (Innate)

- A state of lower ____________________________ activity
- Estivation- ____________________________; heat and drought
- Hibernation- ____________________________; cold and drought

Habituation (Learned)

- Habituation is when an organism stops ____________________________ to a ____________________________ after repeated exposure.

Imprinting (Learned)

- Imprinting is learning that occurs early in ____________________________ that cannot be changed
  such as ducks and geese recognizing the ____________________________ person they see as their mother.

Classical Conditioning (Learned) Stimulus association

- Ex: ____________________________ dogs
  
  Bell = dog ____________________________ because he associates it with ____________________________.
Trial and Error (Learned)

- _________________________ and _________________________

Camouflage

- To __________________, ____________________, smell or sound such that it ________________________ in with their surroundings.

Critical Thinking

- What structural adaptations do animals and plants have for feeding, reproduction and life on land?

- What behavioral adaptations do organisms have that help ensure survival?

Communication within Organisms: Pheromones

- **Pheromones**—(bees, ants, termites) Pheromones are ________________________ released by living organisms that send ________________________ to other organisms of the same species via ________________________. These pheromones are released in response to ________________________, alarm, danger, and sexual ________________________. They are released by both insects and mammals in many situations.

  - Pheromone (ants nearby), Pheromone (releasing scents in response to ________________________, ants also release a scent when they are returning to their nest with food)

Communication within Organisms: Territoriality

- ________________________ communication

- Uses ________________________ (territory) to communicate ownership

- Fighting for resources (____________________, ______________________, ________________________)

- Examples: ________________________, ________________________, dog or cat peeing on things

Communication within Organisms: Courtship Dances

- Courtship Dances—____________________ SELECTION
  - ________________________
  - ________________________
  - ________________________
Human Population

• Demography – the study of ________________ population size
  – Census
  – _______ rate (live births/1000 people)
  – _______ rate (deaths/1000 people)
  – Birth rate – death rate = _______

Human population growth

• ________________ has helped to increase Earth’s carrying capacity and population.
  – gas-powered farm equipment
  – medical advancements

World population and exponential growth

• As the human population grows what might be the impact on the following:
  (1)
  (2)
  (3)

Resource use
• As population ________________, demand for food, water, and land ________________
  – Renewable resources
  – Nonrenewable (cannot be renewed in the environment)
  – Growing use of nonrenewable resources may lead to a crisis.
• Resources must be _____________________________ managed.

Resource use

Negative impacts

• Food
  – ____________________________ (one type of crop) farmlands replace natural habitats
• Water
  – Diverting of natural ____________________________ for cities (Las Vegas)
• Land
  – Habitat ____________________________ to construct new living structures
    • Displaced organisms
  – Urbanization
    • ____________________________ (flooding because of increased paving of roads, parking lots)
  – Beach erosion
    • Structures on beaches aid in the movement of ____________________________
    • Loss of ____________________________

Waste and pollution

• ____________________________ farming
  – Waste runoff from ____________________________
    • Poo in the ____________________________
• Factory ____________________________ (burning of fossil fuels)
  – Sulfur dioxide and ________________ dioxide react with ____________________________ molecules
  – Creates ____________________________ rain
    • Mount ____________________________
    •
  – Carbon dioxide
• CO₂ is a ________________________ gas (keeps heat in, global climate change)

Waste and pollution

• Bioaccumulation
  – Buildup of a ________________________ as it moves up the food web
  – Pesticides
    • ___________: water → zooplankton → fish #1 → fish #2 → seagull
    • DDT ________________________ in seagull was much greater than in water

– Mercury
  • Mad as a hatter
  • Sharks have a high ________________ (top of the food chain!)

Waste and pollution

• CFCs
  – _________________________________
  – Found in _________________, refrigerants, solvents
  – Heavy use of CFCs caused the depletion of the ________________________ layer
    • Ozone layer protects us from harmful ________________ radiation
  – CFCs also act as a ________________________ gas (keeps heat in)
  – Banned in 1989

Loss of biodiversity

Biodiversity

______________________________ of life in an area (or the world)
Availability of _____________________ and ______________________________
Habitat loss is the leading cause of the ________________________ in biodiversity

Biodiversity

A. Invasive species:

______________________________ species inhabit an area with no natural
______________________________ (kudzu, stink bugs)
Invasive species thrive and ________________________ native species

B. Endangered species
A species that is likely to go ____________________________-
Habitat ____________________________, ____________________________, invasive species
Example:
*Spruce fir moss spider*
_____________________________________________________________________________
_____________________________________________________________________________

Global climate change

- Greenhouse gases
  - Hold ____________________________ in the atmosphere
  - Carbon dioxide
    - ____________________________, ____________________________
  - Methane
    - Source of ____________________________
    - Cow farts, rice farming
  - ____________________________ oxide
    - Burning anything!

**Increase in greenhouse gases increases the overall temperature of the Earth***

By 2100, expected increase of _______ °F to 11.5°F
Habitats change too ____________________________
Species cannot ____________________________ quick enough
Leads to mass __________________________

Effective management of Earth’s resources will help meet the needs of the future

- Earth’s resources must be used ____________________________.
- Careless use of resources makes them ____________________________ to future generations.
- Easter Island is an example of irresponsible resource use.

Ecological Footprint

- An ____________________________ ____________________________ is the amount of land needed to support a person.
- The land must produce and maintain enough
  - ____________________________
  - ____________________________
  - ____________________________
  - ____________________________
  - ____________________________
- Several factors affect the size of the ecological footprint.
  - amount and ____________________________ of resource use
  - amount and ____________________________ of waste produced

Disease and human population growth

- Viruses and Pathogens
- Not just human pathogens!

**MS. OSBORNE WRITING NOTES....COPY THESE HERE**
1. What type of population growth is shown in Graph A? Explain this type of growth.

2. Which graph shows the most likely growth of a squirrel population living in a forest?

3. Which graph shows a population's growth under ideal conditions?

4. Why don’t populations of organisms grow indefinitely?
Biodiversity

- A wide range of different __________________ of organisms living in an ecosystem
- More biodiversity = More ___________________ in the ecosystem
  - Biodiversity – _______________________
  - No biodiversity – _______________________
- Biodiversity allows ecosystems to better __________________ a catastrophic environmental event

9. Biodiversity provides our world with beauty.

10. The loss of a species from an ecosystem usually has no effect because of the presence of other species in the ecosystem.

11. Biodiversity decreases the stability of ecosystems because more species are competing with each other.

12. Increasing the biodiversity of an ecosystem may result in more niches.

13. Diseases are more likely to spread in an ecosystem with high biodiversity than in an ecosystem with low biodiversity.

14. A decrease in Earth’s biodiversity may affect people’s diets.

15. Preserving diverse plant species may lead to the discovery of new drugs in the future.
UNIT 1: ECOLOGY GUIDED NOTES

Cycles of Materials

- Which are the most abundant elements found in organisms?
  - Carbon
  - Oxygen

Carbon Cycle

Driven by _______________________________ respiration and _______________________________

In what form is carbon dioxide found in the atmosphere?

How does carbon enter the food chain?

What human activities increase the amount of carbon in the atmosphere?

Nitrogen Cycle

- Plants and animals can’t use ________________________________ nitrogen – it has to be converted!
- Nitrogen-Fixing _______________________________ drive the nitrogen cycle
  - Nitrogen → _______________________________
- They live in the root _________________________ of ______________________ (bean plants)

The ability of an organism to withstand fluctuations in environmental factors is known as ________.

Nitrogen Cycle and Human Impact
<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tiny organisms that break down and absorb nutrients from dead organisms</td>
<td>a. autotroph</td>
</tr>
<tr>
<td>2. Obtains energy by feeding on other living organisms</td>
<td>b. commensalism</td>
</tr>
<tr>
<td>3. Step in the passage of energy and matter through an ecosystem</td>
<td>c. decomposer</td>
</tr>
<tr>
<td>4. Place where an organism lives out its life</td>
<td>d. food chain</td>
</tr>
<tr>
<td>5. Relationship between species in which one species benefits at the expense of another</td>
<td>e. food web</td>
</tr>
<tr>
<td>6. Manufactures nutrients using energy from the sun or from chemical compounds</td>
<td>f. heterotroph</td>
</tr>
<tr>
<td>7. Collection of interacting populations</td>
<td>g. parasitism</td>
</tr>
<tr>
<td>8. Simple model for showing how matter and energy move through an ecosystem</td>
<td>h. scavenger</td>
</tr>
<tr>
<td>9. Eats dead organisms</td>
<td>i. trophic level</td>
</tr>
<tr>
<td>10. Portion of Earth that supports life</td>
<td>j. habitat</td>
</tr>
<tr>
<td>11. Relationship between species in which one species benefits and the other is neither harmed nor benefited</td>
<td>k. community</td>
</tr>
<tr>
<td>12. Network of interconnected food chains</td>
<td>l. biosphere</td>
</tr>
<tr>
<td>13. Relationship between species in which both species benefit</td>
<td>m. ecology</td>
</tr>
<tr>
<td>14. Study of interactions among organisms and their environments</td>
<td>n. mutualism</td>
</tr>
</tbody>
</table>
Sixty-five million years ago, when cows ruled the earth.

“And, as amoebas, you’ll have no problems recruiting other sales reps … just keep dividing and selling.”

“Dibs.”
1. Thymine makes up 32% of the nucleotides in a sample of DNA. What percentage of the nucleotides, therefore, is guanine?
   A  36%   C  18%
   B  32%   D  16%

2. A fire completely destroys an ecosystem, driving away all the organisms and burning all vegetation to the ground. What is the first organism that needs to return in order for the ecosystem to reestablish itself?
   A  mountain lions
   B  grasshoppers
   C  birds
   D  plants

3. Which of the following statements about nucleic acids is true?
   A  Nucleotides are made of a 5-carbon sugar, a nitrogen base, and a lipid.
   B  DNA and RNA are examples of nucleic acids that are rarely seen in living things.
   C  Nucleic acids are made of repeating units called lipids.
   D  Nucleic acids store important information about cell division and the manufacturing of proteins.

4. Which organelle shown in the picture above is used to transport compounds throughout the cell?
   A  ribosome
   B  endoplasmic reticulum
   C  nucleus
   D  mitochondrion

5. In vascular plants, what is the purpose of vascular tissue?
   A  to transport water and dissolved minerals throughout the plant
   B  to transport sugars from the leaves to the rest of the plant
   C  to transport water and dissolved minerals from the leaves to the rest of the plant
   D  to transport excess water and minerals from the plant back to the ground
6. Hemophilia is a recessive, sex-linked trait. A healthy mother and a hemophiliac father have a hemophiliac daughter. Which of the following statements is true?
   A All of their children will be hemophiliacs.
   B None of their sons will be hemophiliacs.
   C They can have a healthy daughter who is not a carrier.
   D They can have a healthy son.

7. What is the function of the nucleus?
   A control center of the cell and stores genetic information
   B contains enzymes to break down certain materials
   C site of ribosome synthesis
   D packages chromosomes to be moved into the cytoplasm

8. Which organism would be found at the top of an energy pyramid?
   A alligator   C shrimp
   B bass   D green algae

9. Which of the following would be found in a prokaryotic cell?
   A mitochondria
   B ribosomes
   C endoplasmic reticulum
   D golgi apparatus

10. Which of the following is the best description of homeostasis?
   A the movement of materials into and out of a cell
   B the transport of molecules against the concentration gradient
   C a state of biological balance
   D when the same number of molecules are inside and outside of the cell

11. Which of the following is least likely affecting the state of a pond?
    A chemical fertilizer runoff from cropland
    B manure runoff from cropland
    C animal waste runoff from cattle and chickens
    D trash produced by a farmer and his family
18. Bread rises as a result of yeast fermentation. How does fermentation cause the bread to rise?
   A  Oxygen released during fermentation is trapped in the dough and causes the bread to rise.
   B  Alcohol that is produced during fermentation and trapped in the dough causes the bread to rise.
   C  Carbon dioxide that is released during fermentation and trapped in the dough causes the bread to rise.
   D  Carbon dioxide and oxygen that are released during fermentation cause the dough to rise.

20. What type of pollination is most likely used by a plant that produces a large number of small seeds that are attached to feather-like structures?
   A  insect  C  wind
   B  water  D  self

21. What can you state about the organisms Quercus alba and Quercus phellos by examining their names?
   A  They are the same organism.
   B  They are not related.
   C  They are closely related.
   D  They are distantly related.

22. Which of the following statements about carbohydrates is true?
   A  Carbohydrates consist of carbon, hydrogen, oxygen, and nitrogen.
   B  The ratio of hydrogen to oxygen is always 2:1.
   C  There are four classes of carbohydrates.
   D  Carbohydrates have a linear structure.