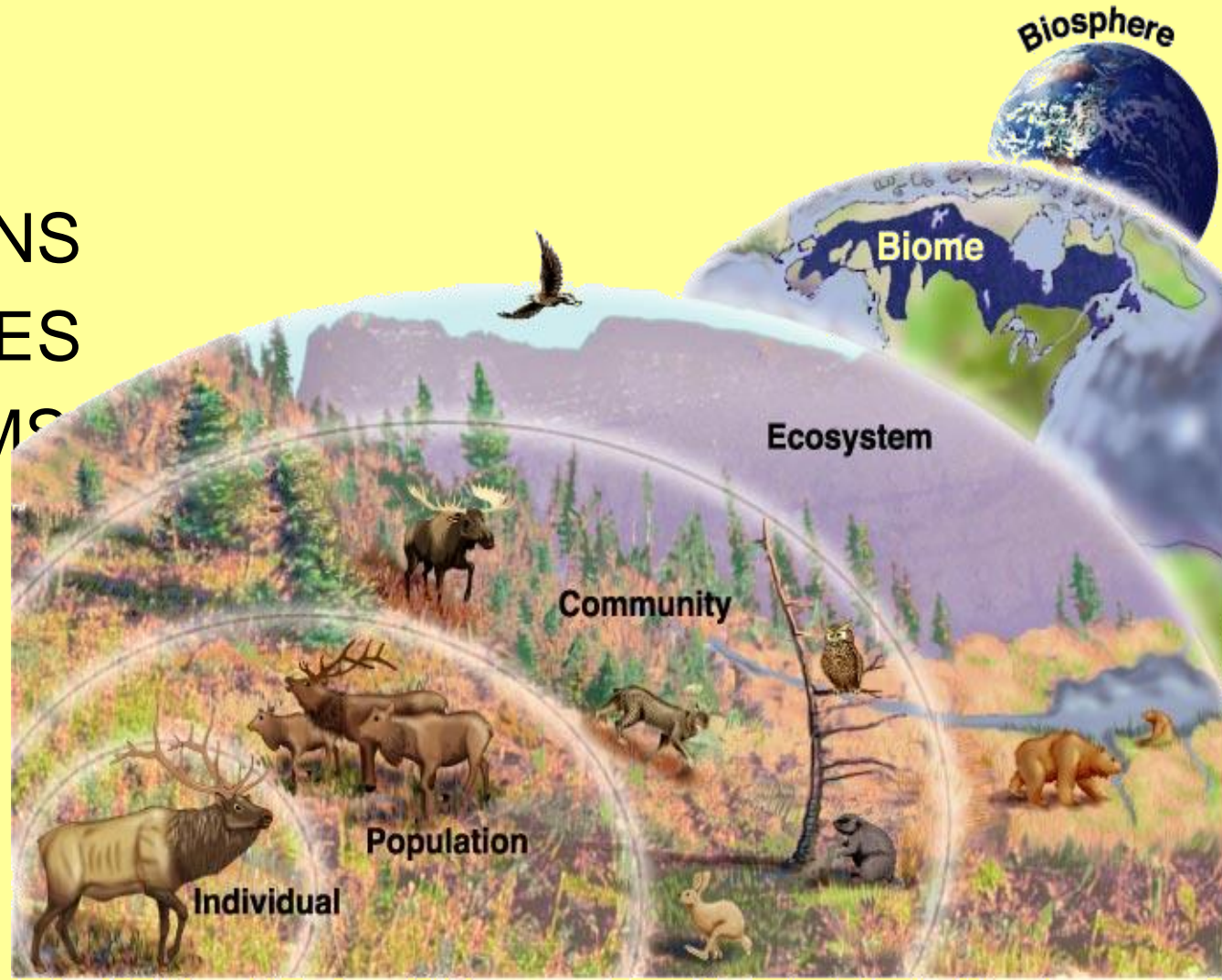


TROPHIC LEVELS OF ORGANIZATION

- SPECIES
- POPULATIONS
- COMMUNITIES
- ECOSYSTEMS
- BIOME
- BIOSPHERE



TEKS BIO.12

The student knows
that

mutually
dependent



interdependence
and interactions

contact



occur within an
environmental
system.

- **SPECIES** - A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.
- **POPULATIONS** – All the same kind of inhabitants of a particular place.
- **COMMUNITIES** - an assemblage of two or more populations of different species occupying the same geographical area

- **ECOSYSTEM** - the relationships between organisms and their environments
- **BIOME** - A major ecological community of organisms adapted to a particular climatic or environment condition on a large geographic area in which they occur.
- **BIOSPHERE** – all of the ecosystems of the Earth.

- **ECOLOGY**: scientific study of interactions among organisms, between organisms, in their environment

SE - B.12.C

- Analyze the flow of matter and energy through ***trophic levels*** using various models, including ***food chains***, ***food webs***, and ***ecological pyramids***. (Read Stan.)

Ecology Vocabulary

- **PRODUCERS** - use sunlight/chemicals to make own food/energy (autotrophs)

List 2 examples:

- **CONSUMERS** - use other organisms for food/energy (heterotrophs)

List 2 examples

- **Abiotic** – All of the **non-living** elements in an ecosystem like air, water, and temperature.
- **Biotic** – All of the **living** elements in an ecosystem.

TYPES OF CONSUMERS

- **HERBIVORES:** get energy from only plants
Example: cows and deer
- **CARNIVORES:** get energy from only animals
Example: tigers and wolves
- **OMNIVORES:** get energy from both plants and animals
Example: humans and bears
- **DETRITIVORES:** get energy from remains of plants and animals
Example: mites and crabs

TROPHIC LEVELS

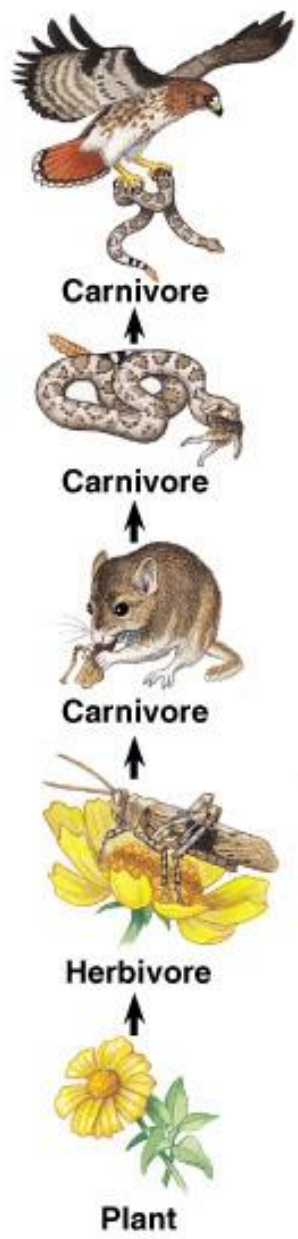
- Energy levels in a food chain or food web
 - Producers = always first trophic level
 - Consumers = second, third, etc. trophic levels
 - Decomposers = the last trophic level

FOOD CHAIN

- Energy transfer from one organism to another in a series of steps. Arrows represent the flow of energy from one organism to the next

- **EXAMPLE:**





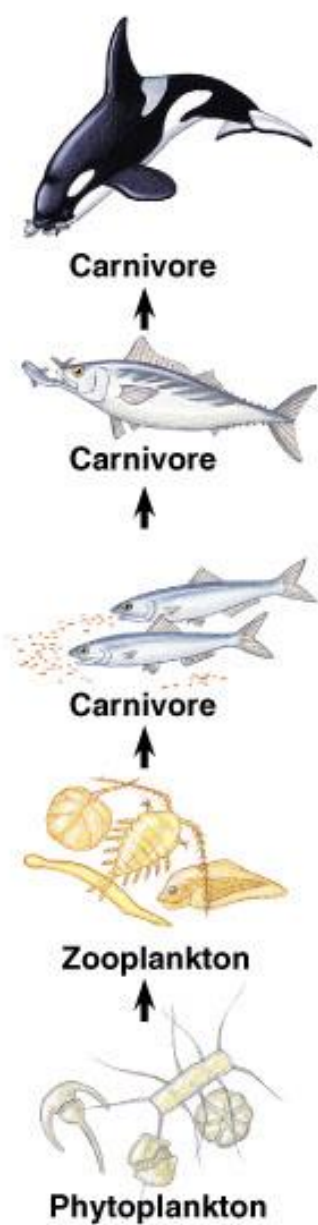
Quaternary consumers

Tertiary consumers

Secondary consumers

Primary consumers

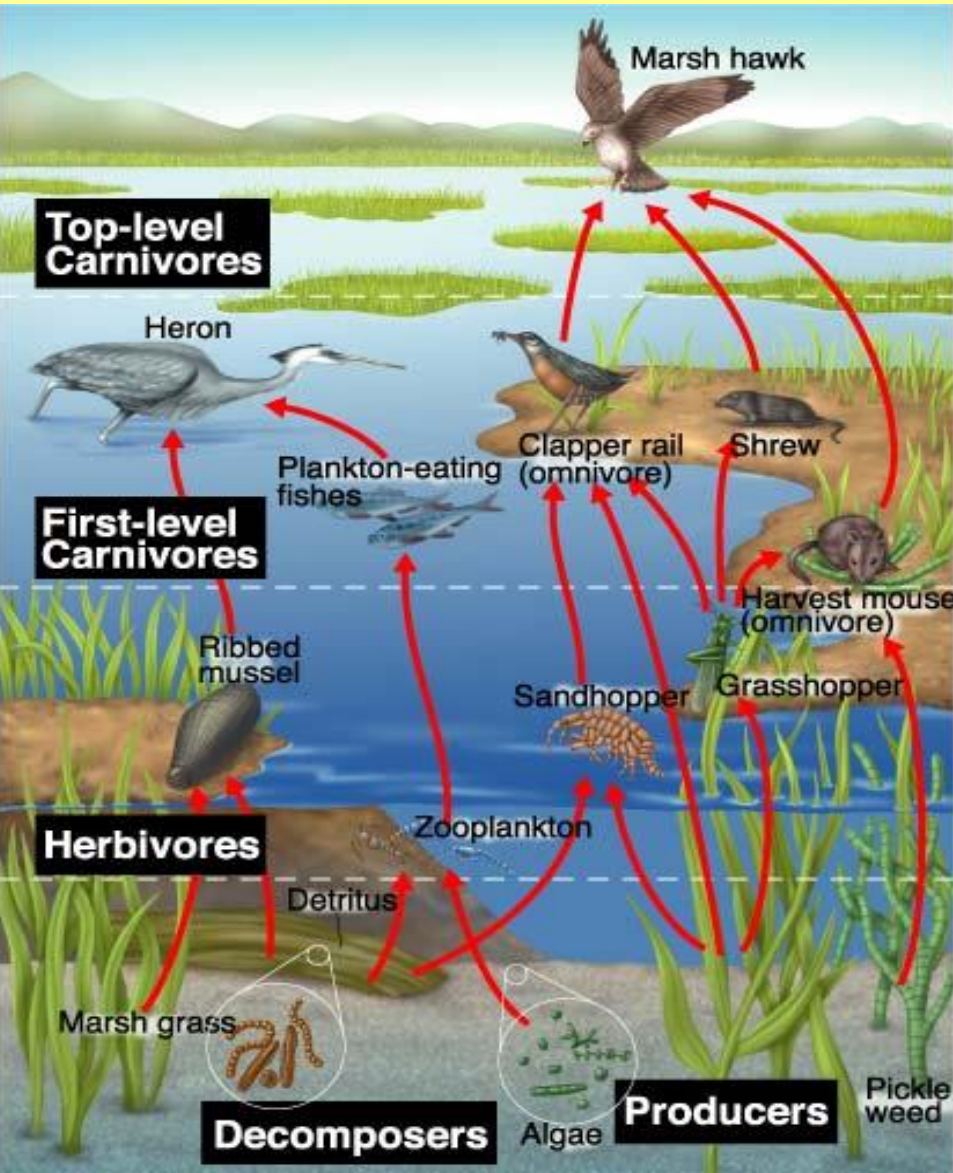
Primary producers



A terrestrial food chain

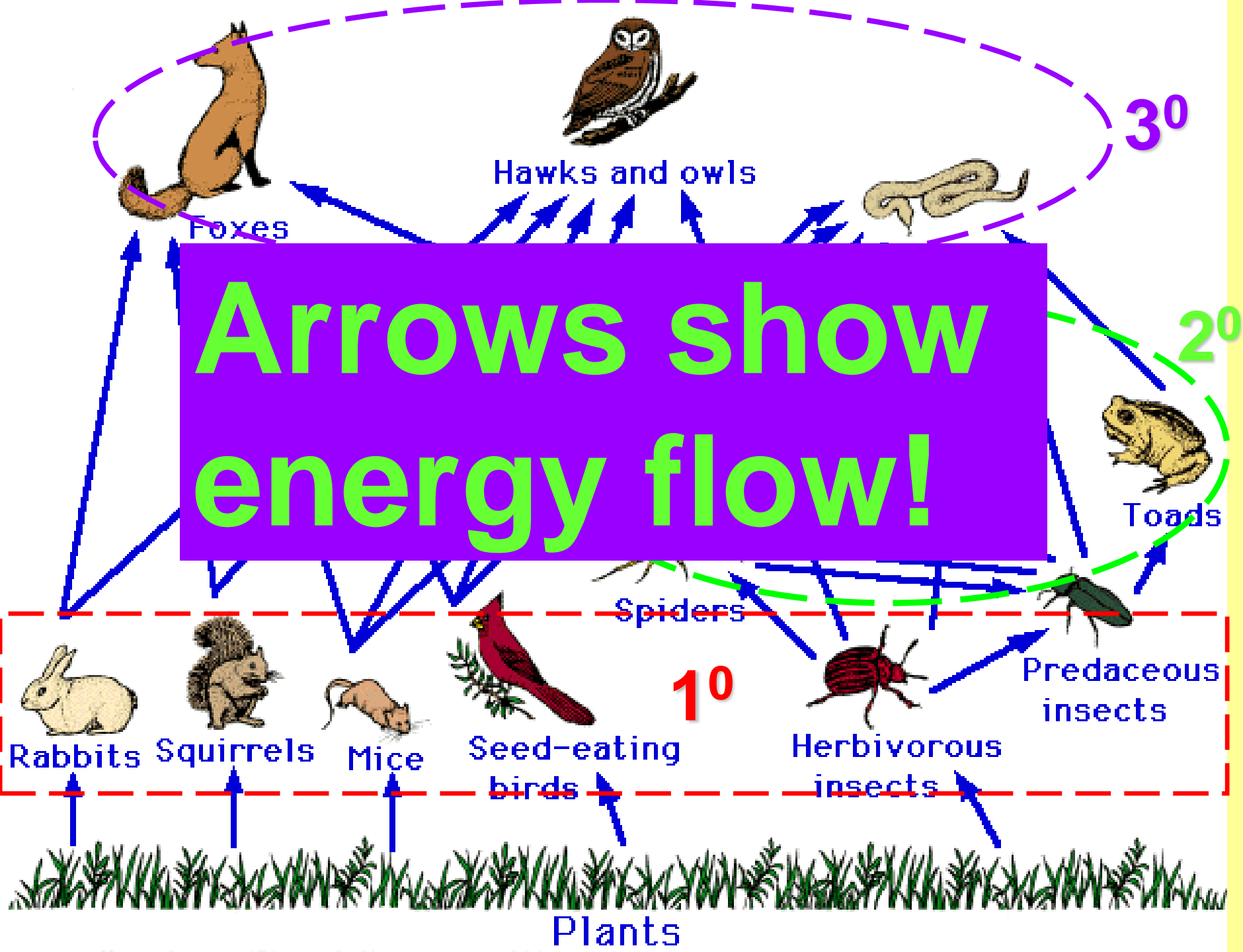
A marine food chain

FOOD WEBS



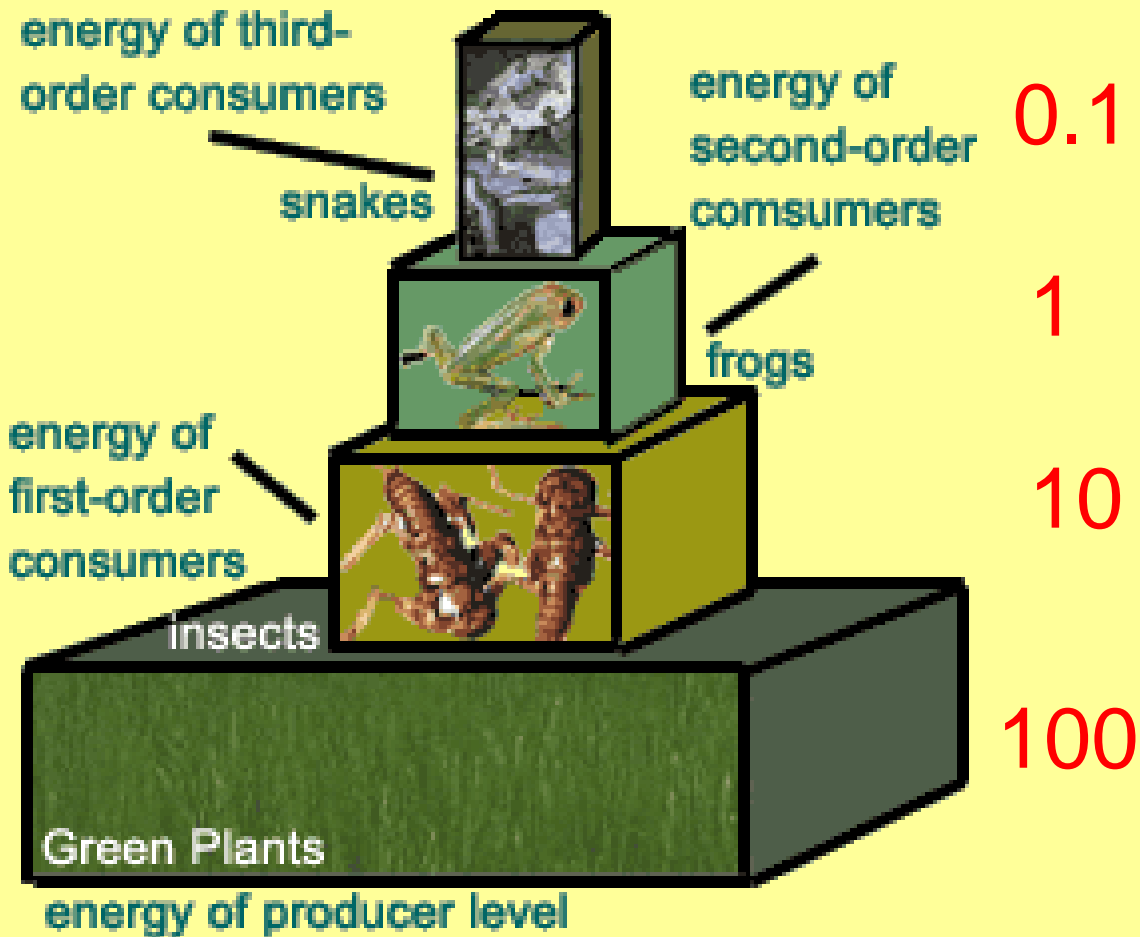
- More complex than food chain
- Shows relationships among many different animals in an area
- Where are the trophic levels in this figure?

Arrows show energy flow!



•Organisms use about **10% of energy** from each trophic level

•**The rest is lost as heat**



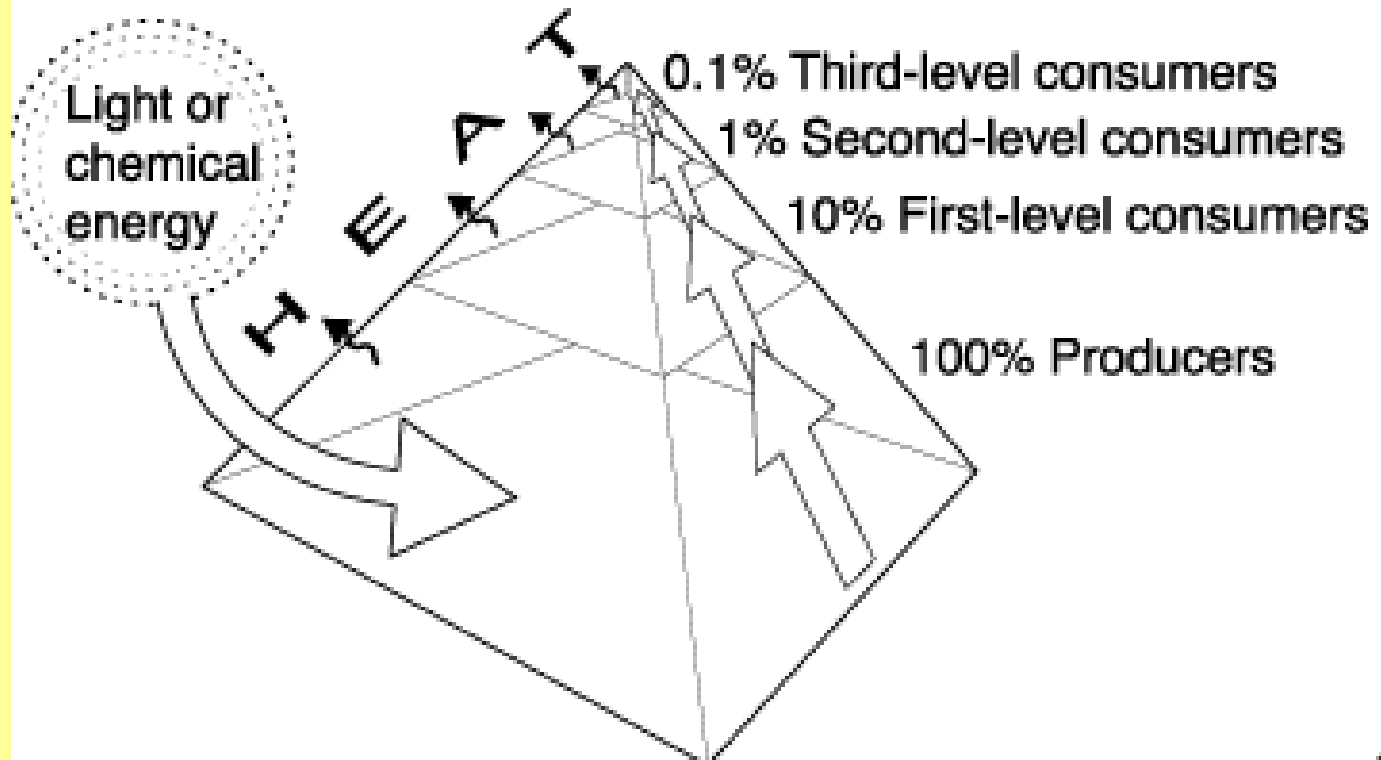
ENERGY PYRAMIDS

- **ENERGY PYRAMID:**
 - Shows the relative amount of energy available in each trophic level
- **BIOMASS PYRAMID:**
 - Total amount of living tissue for each trophic level
 - Represents the amount of food available in each trophic level
- **PYRAMID OF NUMBERS:**
 - Number of organisms in each trophic level

ENERGY PYRAMIDS

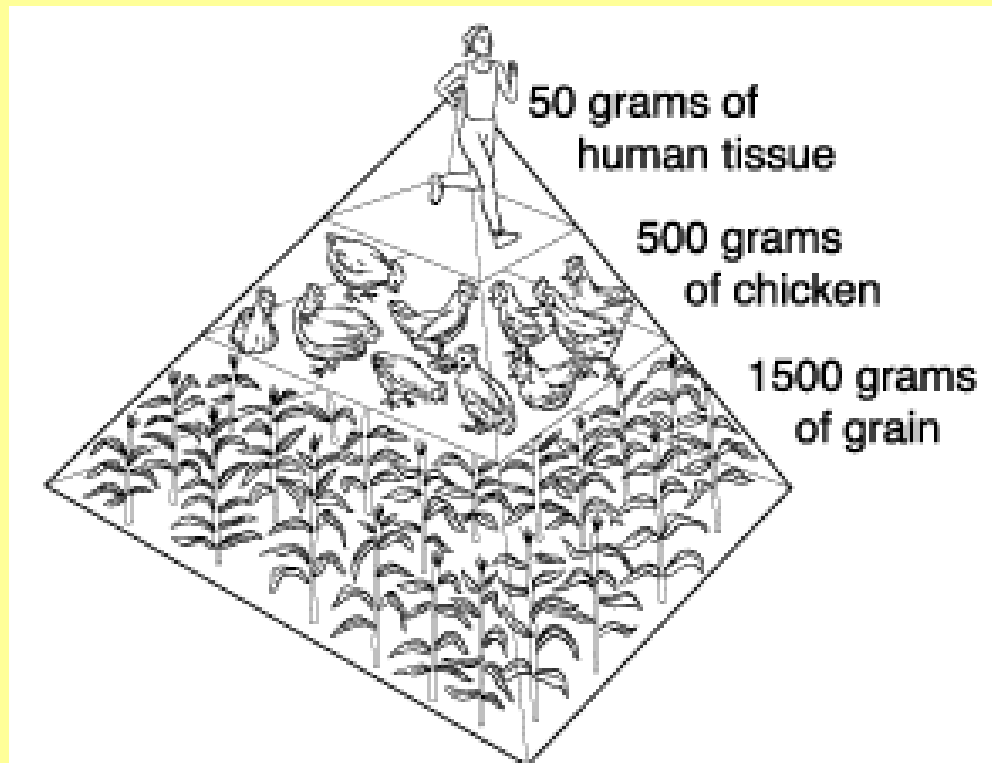
- **ENERGY PYRAMID:**

- Shows the relative amount of energy available in each trophic level

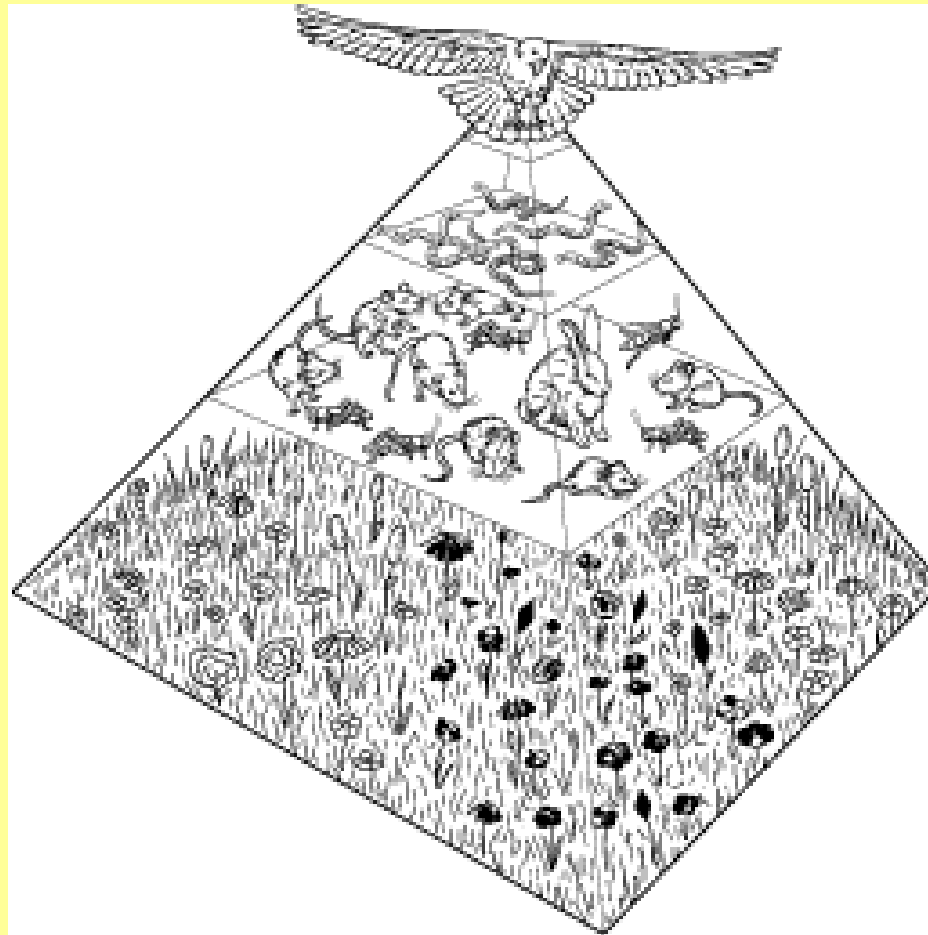


- **BIOMASS PYRAMID:**

- Total amount of living tissue for each trophic level
- Represents the amount of food available in each trophic level



- **PYRAMID OF NUMBERS:**
 - Number of organisms in each trophic level



FOOD CHAIN ENERGY PYRAMID

HAWK

3rd Order
Consumer

SNAKE

2nd Order
Consumer

RABBIT

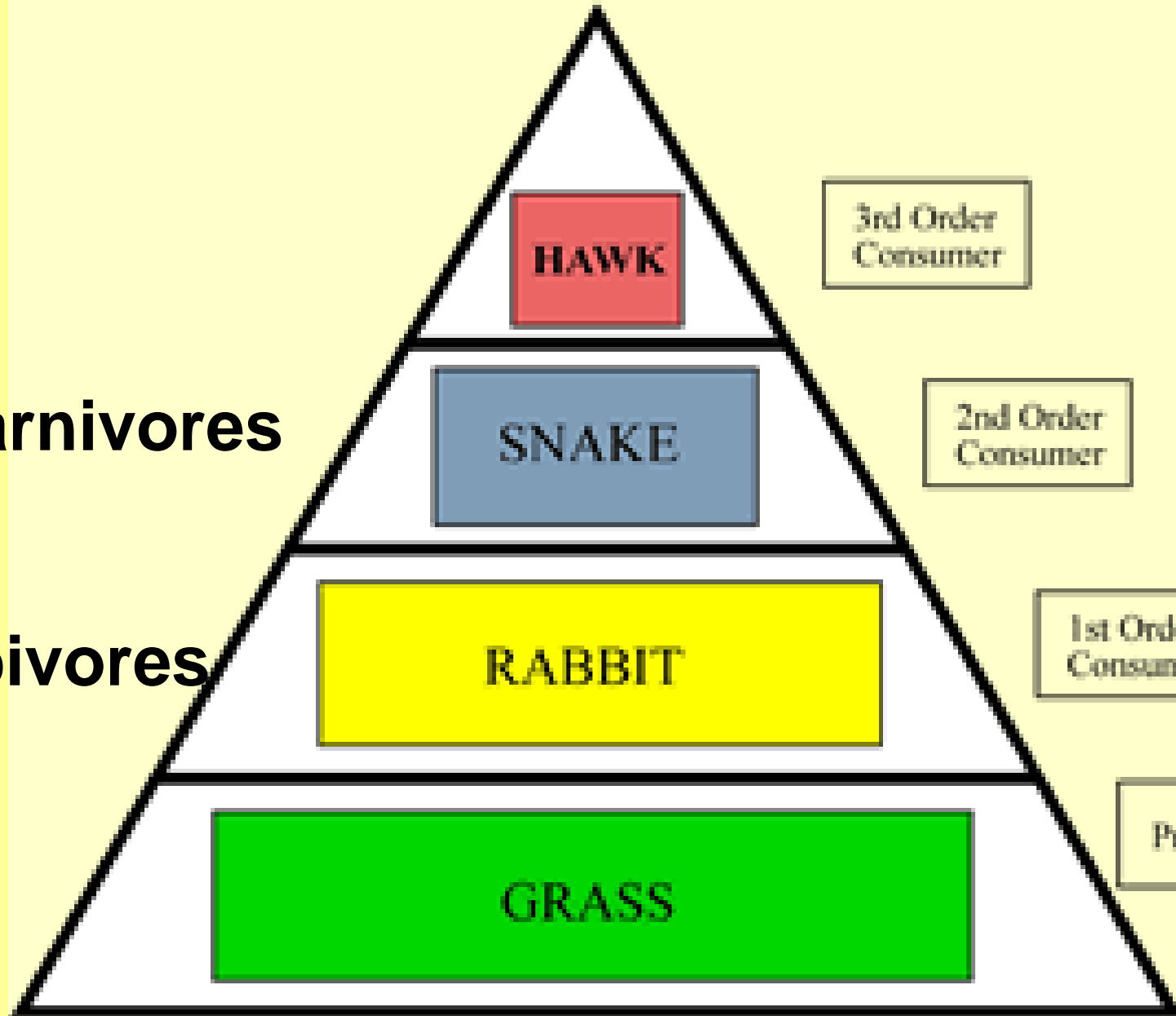
1st Order
Consumer

GRASS

Producers

Carnivores

herbivores



- Two laws of physics are important in the study of energy flow through ecosystems. The **first law of thermodynamics** states that energy cannot be created or destroyed; it can only be changed from one form to another. Energy for the functioning of an ecosystem comes from the Sun. Solar energy is absorbed by plants where in it is converted to stored chemical energy.
- The **second law of thermodynamics** states that whenever energy is transformed, there is a loss of energy through the release of heat. This occurs when energy is transferred between trophic levels as illustrated in a **food web**. When one animal feeds off another, there is a loss of heat (energy) in the process. Additional loss of energy occurs during respiration and movement. Hence, more and more energy is lost as one moves up through trophic levels. This fact lends more credence to the advantages of a vegetarian diet. For example, 1350 kilograms of corn and soybeans is capable of supporting one person if converted to beef. However, 1350 kilograms of soybeans and corn utilized directly without converting to beef will support 22 people!
- <http://www.youtube.com/watch?v=ScizkxMIEOM>