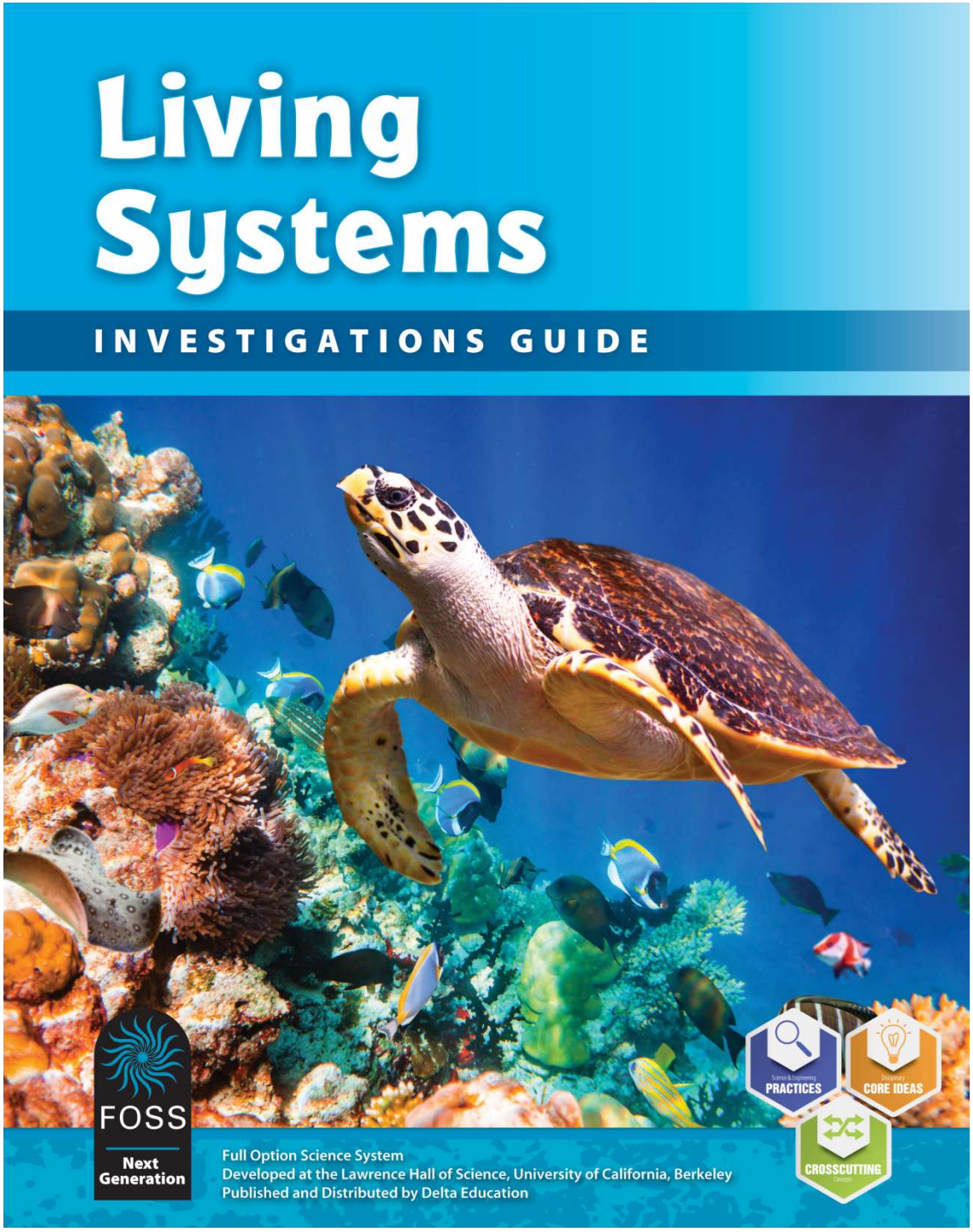


Investigation 1 - Systems

PART 2:
The Earth System

NGSS Standards:
5-PS3-1
5-LS2-1
5-ESS2-1

2 sessions

This symbol means that we write down a FOCUS QUESTION into our notebooks. The focus question is the learning objective.

Is planet Earth a system?

Physical Systems
https://www.fossweb.com/video?videoID=D2881758

Use the Video Review sheet to **record information as you watch the video.

Video:
- Teaching the Module
- Interactive
- Investigation
- Guided Activity

"Physical Systems" Video Review

1. What effect did the eruption of Mount St. Helens have on the geosphere, atmosphere, hydrosphere, and biosphere of the region?
2. What is an ecosystem?
3. In what ways do people affect the balance of production and consumption within an ecosystem?
4. What was the dust bowl?
5. What are invasive species? Why are they considered one of the greatest threats to an ecosystem?
6. When is a system said to be in a state of equilibrium?
7. What are renewable resources? Provide some examples.

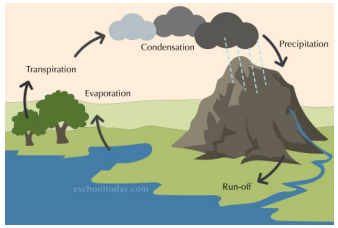
Is planet Earth a system?

Earth can be described as being made of **four large systems**:

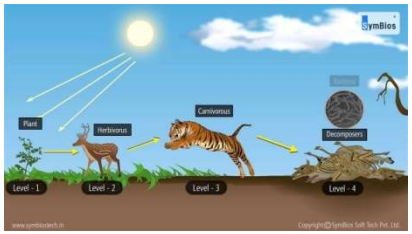
Geosphere: (sometimes called the lithosphere) is Earth's rocks, minerals, and landforms.

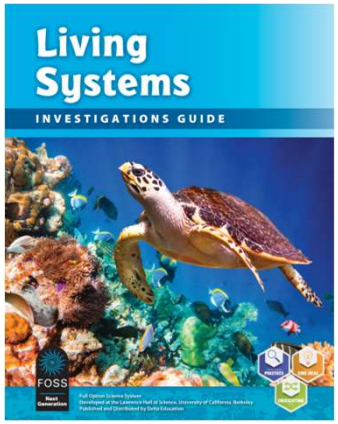
Atmosphere: is the gases surrounding Earth at a depth of up to several hundred kilometers.

Hydrosphere: is the water on Earth on the rivers, lakes, seas, groundwater, oceans and atmosphere.



Biosphere: is all the plants, animals, and other living things in the water, on the land, and in the air.





Is planet Earth a system?

Partner-Read "**Is Earth a System**" - page 5 & 6.

- Answer the focus question above in your notebook.
- Answer the questions at the end of the article and discuss them with your partner.
- Notebooks will be collected and graded.

Discuss: Biosphere

Biosphere: is all the plants, animals, and other living things in the water, on the land, and in the air.

Is the biosphere a subsystem?

Is the biosphere a simple or complex system?

End session

Review What We Have Learned:

Earth can be described as being made of four large systems:

Geosphere: (sometimes called the lithosphere) is Earth's rocks, minerals, and landforms.

Atmosphere: is the gases surrounding Earth at a depth of up to several hundred kilometers.

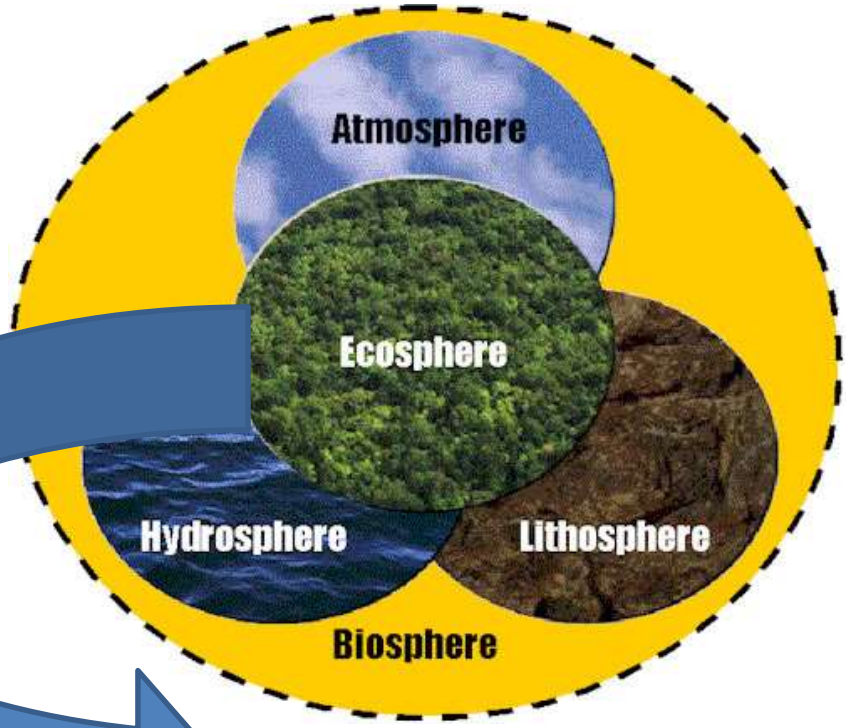
Hydrosphere: is the water on Earth on the rivers, lakes, seas, groundwater, oceans and atmosphere.

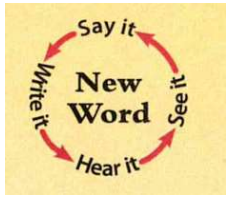
Biosphere: is all the plants, animals, and other living things in the water, on the land, and in the air.

Each of these is a **subsystem** of the Earth (the larger system).

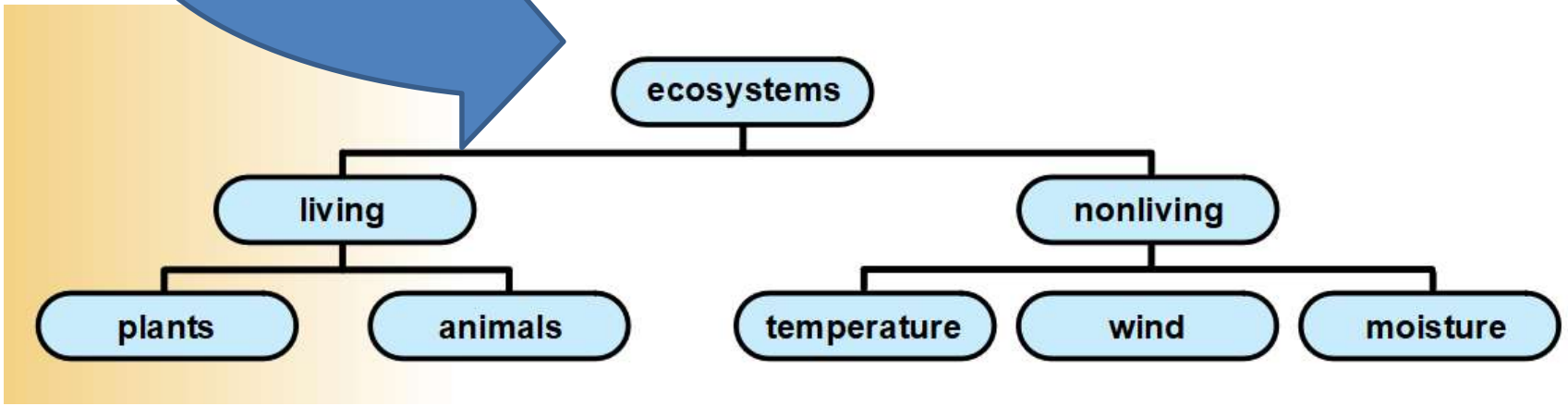
Biosphere: is all the plants, animals, and other living things in the water, on the land, and in the air.

Why is the biosphere considered a ***subsystem****?*

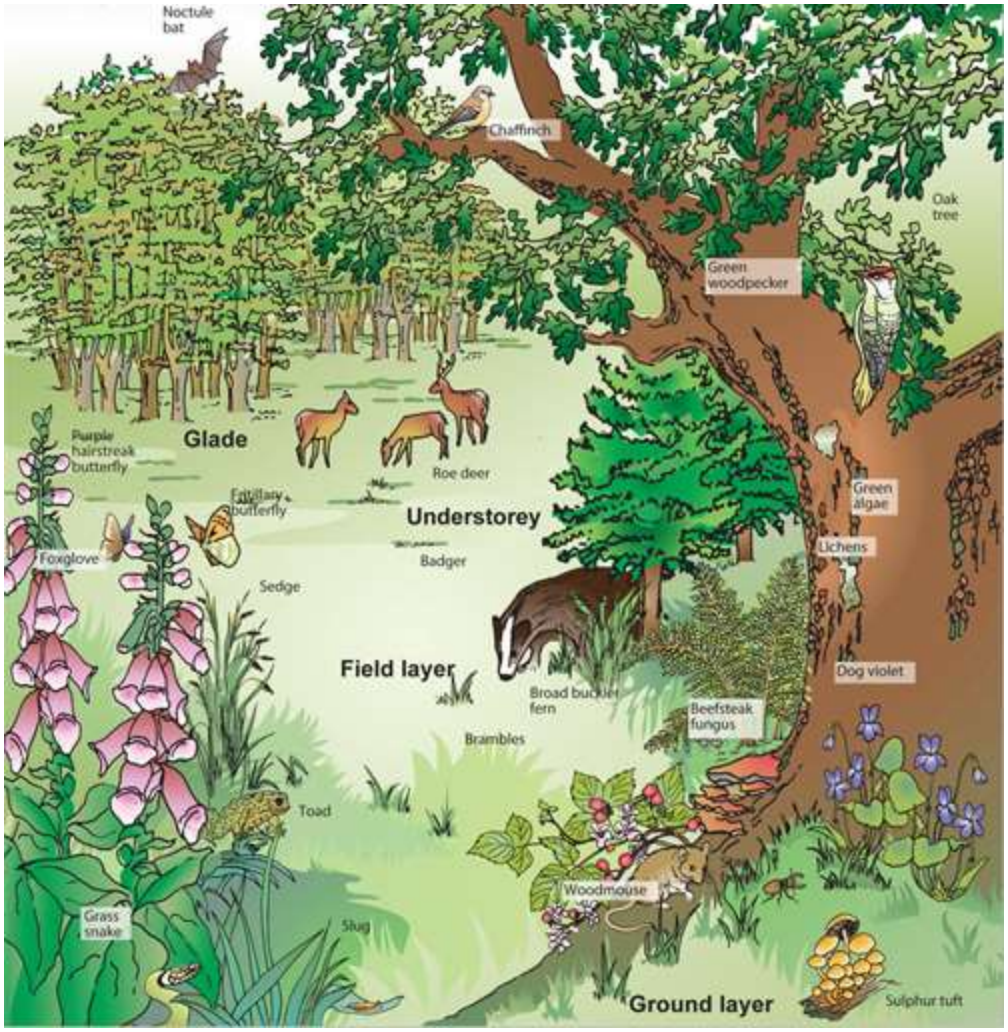




An **ecosystem** is complex community of organisms interacting with each other and with the nonliving environment.



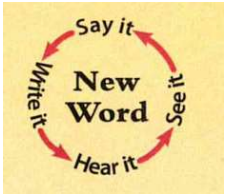
Ecosystem: is a complex system of organisms. Thousands of organisms living and nonliving interact in an ecosystem. A great example of an ecosystem is the woods.



In any woods or forest, there are hundreds or thousands of interacting populations of organisms.

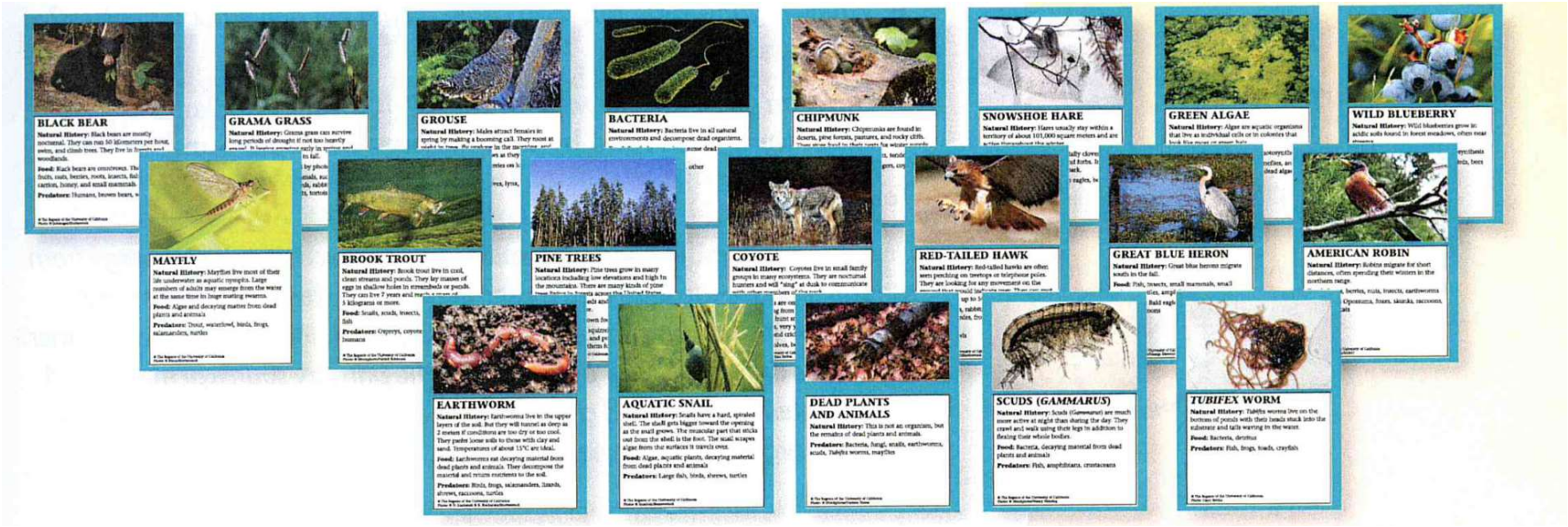
One way that organisms interact in the woods is through feeding relationships, that is referred to as a **food chain**.

A **food chain** is the *path that food takes from one organism to another*.



Food-web cards:

Each group will receive a packet of food web cards.



Task:

1. Spread out the cards.
2. Each group member takes 5 cards randomly.
3. Identify a feeding relationship (one eats the other) between **2 pairs of organisms**
4. Share out several feeding **pairs**.
5. Next, group together **3 organisms** in a feeding relationship.

BLACK BEAR

Natural History: Black bears are mostly nocturnal. They can run 50 kilometers per hour, swim, and climb trees. They live in [illegible] woodlands.

Food: Black bears are omnivores. They fruits, nuts, berries, roots, insects, fish, carrion, honey, and small mammals.

Predators: Humans, brown bears,

GRAMA GRASS

Natural History: Grama grass can survive long periods of drought if not too heavily [illegible] its fall.

GROUSE

Natural History: Males attract females in spring by making a booming call. They roost at night in trees. By sundown in the meadow, [illegible] as they

BACTERIA

Natural History: Bacteria live in all natural environments and decompose dead organisms.

CHIPMUNK

Natural History: Chipmunks are found in deserts, pine forests, pastures, and rocky cliffs.

SNOWSHOE HARE

Natural History: Hares usually stay within a territory of about 101,000 square meters and are

GREEN ALGAE

Natural History: Algae are aquatic organisms that live as individual cells or in colonies that

WILD BLUEBERRY

Natural History: Wild blueberries grow in acidic soils found in forest meadows, often near

MAYFLY

Natural History: Mayflies live most of their life underwater as aquatic nymphs. Large numbers of adults may emerge from the water at the same time in huge mating swarms.

Food: Algae and decaying matter from dead plants and animals

Predators: Trout, waterfowl, birds, frogs, salamanders, turtles

BROOK TROUT

Natural History: Brook trout live in cool, clean streams and ponds. They lay masses of eggs in shallow holes in streambeds or ponds. They can live 7 years and reach a mass of 5 kilograms or more.

Food: Snails, scuds, insects, fish

Predators: Ospreys, coyote humans

PINE TREES

Natural History: Pine trees grow in many locations including low elevations and high in the mountains. There are many kinds of pine [illegible] across the United States

COYOTE

Natural History: Coyotes live in small family groups in many ecosystems. They are nocturnal hunters and will "sing" at dusk to communicate

RED-TAILED HAWK

Natural History: Red-tailed hawks are often seen perching on treetops or telephone poles. They are looking for any movement on the

GREAT BLUE HERON

Natural History: Great blue herons migrate south in the fall.

Food: Fish, insects, small mammals, small

AMERICAN ROBIN

Natural History: Robins migrate for short distances, often spending their winters in the northern range.

Opossums, foxes, skunks, raccoons,

EARTHWORM

Natural History: Earthworms live in the upper layers of the soil. But they will tunnel as deep as 2 meters if conditions are too dry or too cool. They prefer loose soils to those with clay and sand. Temperatures of about 15°C are ideal.

Food: Earthworms eat decaying material from dead plants and animals. They decompose the material and return nutrients to the soil.

Predators: Birds, frogs, salamanders, lizards, shrews, raccoons, turtles

AQUATIC SNAIL

Natural History: Snails have a hard, spiraled shell. The shell gets bigger toward the opening as the snail grows. The muscular part that sticks out from the shell is the foot. The snail scrapes algae from the surfaces it travels over.

Food: Algae, aquatic plants, decaying material from dead plants and animals

Predators: Large fish, birds, shrews, turtles

DEAD PLANTS AND ANIMALS

Natural History: This is not an organism, but the remains of dead plants and animals.

Predators: Bacteria, fungi, snails, earthworms, scuds, *Tubifex* worms, mayflies

SCUDS (*GAMMARUS*)

Natural History: Scuds (*Gammarus*) are much more active at night than during the day. They crawl and walk using their legs in addition to flexing their whole bodies.

Food: Bacteria, decaying material from dead plants and animals

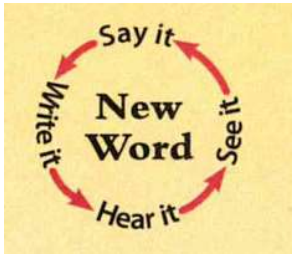
Predators: Fish, amphibians, crustaceans

TUBIFEX WORM

Natural History: Tubifex worms live on the bottom of ponds with their heads stuck into the substrate and tails waving in the water.

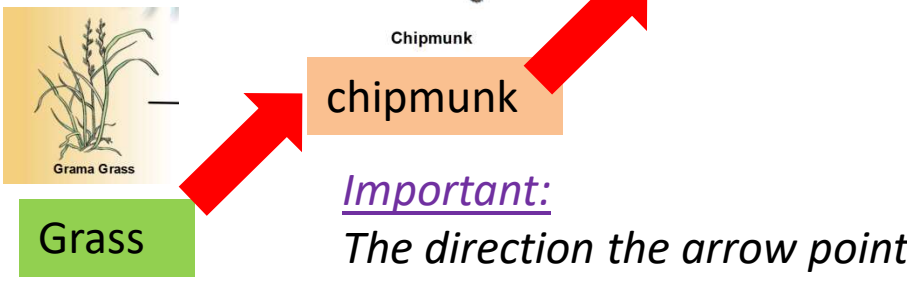
Food: Bacteria, detritus

Predators: Fish, frogs, toads, crayfish

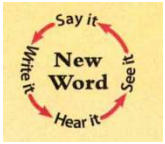


A **food chain** is the *path that food takes from one organism to another*.

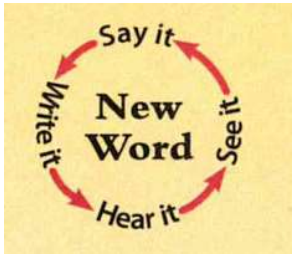
TASK:
Create a food chain of 3 organisms. Draw and label the food chain in your notebook.



Important:
The direction the arrow points shows the direction food (energy and matter) moves through a food chain.



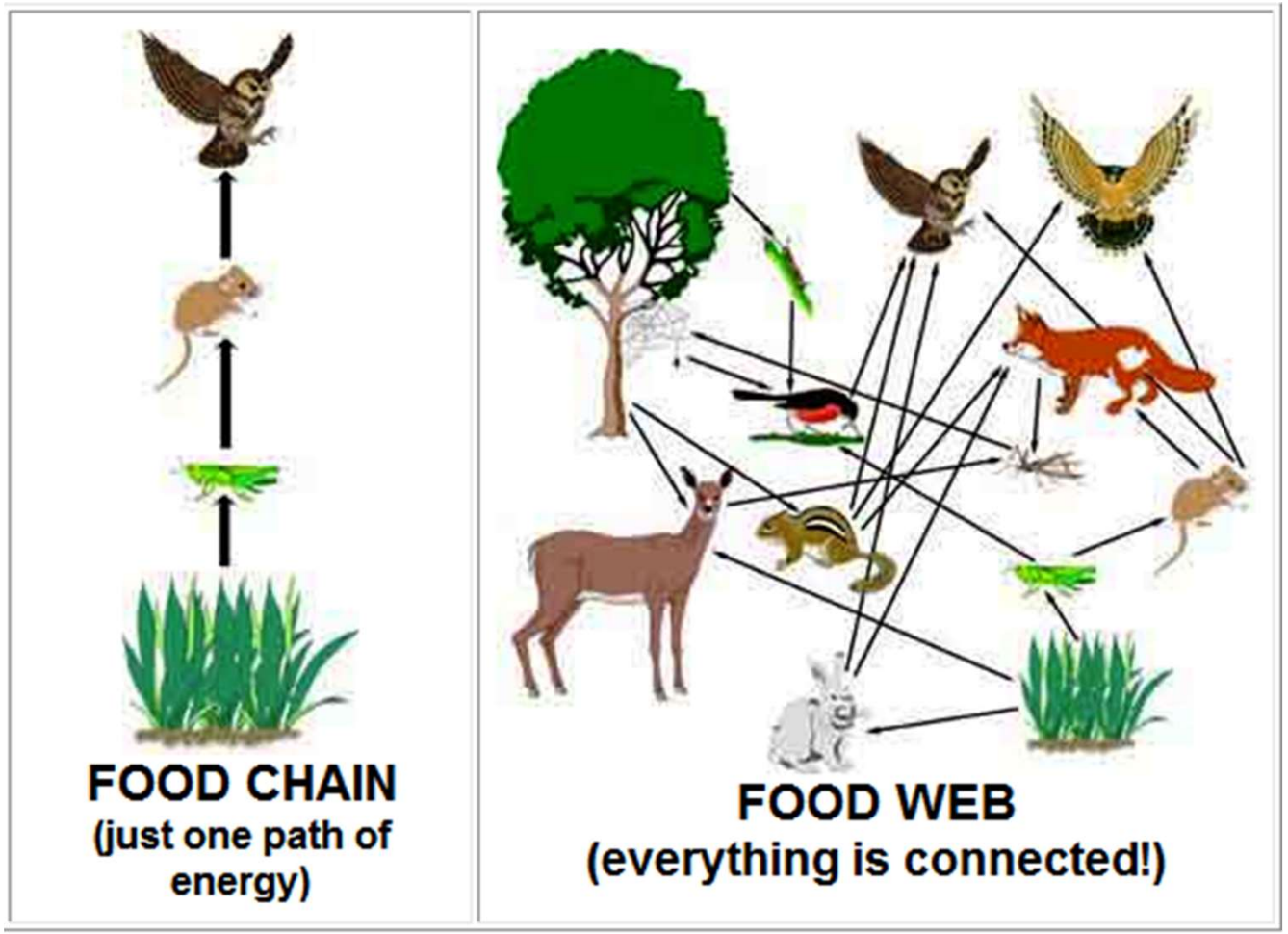
Producers	**Organisms, such as plants or algae, that makes its own food.**	**grass, algae, trees, wild berries**
Consumers	**Organisms that eat other organisms.** **Herbivores: animals that eat plants.** **Carnivores: animals that eat other animals .** **Omnivores: animals that eat both plants and animals.**	**bears, chipmunks, hawks, fish, coyote** **Predators - an animal that hunts and catches other animals for food.**
Decomposers	Organisms that break down plant and animal matter into simple chemicals.	Bacteria – microorganisms that decompose things.

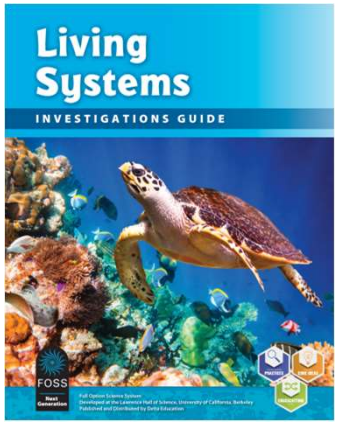


A **food web** shows ALL the paths of feeding relationships between all organisms in an ecosystem.

The arrows show the flow of energy and matter from one organism to another.

TASK:
As a group, spread out all of your cards. Use the arrows provided to create a food web.





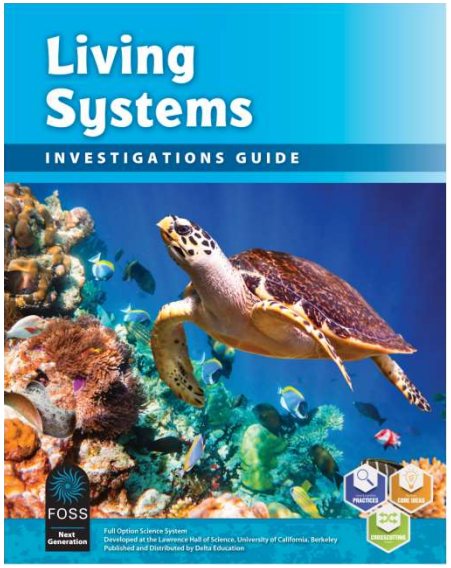
Is planet Earth a system?

Homework: Read "**Biosphere**" - pages 7 - 11.
Article posted on our classroom website.

- Answer the questions at the end of the article. "Thinking about the Biosphere".

- Notebooks will be graded.

End session



Living Systems

WORD WALL

Geosphere:
(sometimes called the lithosphere) is Earth's rocks, minerals, and landforms

Atmosphere:
is the gases surrounding Earth at a depth of up to several hundred kilometers.

Hydrosphere:
is the water on Earth on the rivers, lakes, seas, groundwater, oceans and atmosphere

Biosphere:
is all the plants, animals, and other living things in the water, on the land, and in the air.

Ecosystem:
A complex community of organisms interacting with each other and with the nonliving environment.

Food Chain:
A description of the feeding relationship between organisms in an environment.

Producers:
Organisms, such as plants or algae, that makes its own food.

Consumers:
Organisms that eat other organisms.
Herbivores, Carnivores, Omnivores.

Decomposers:
Organisms that break down plant and animal matter into simple chemicals.

Food Web:
The feeding relationship among ALL the organisms in an ecosystem.