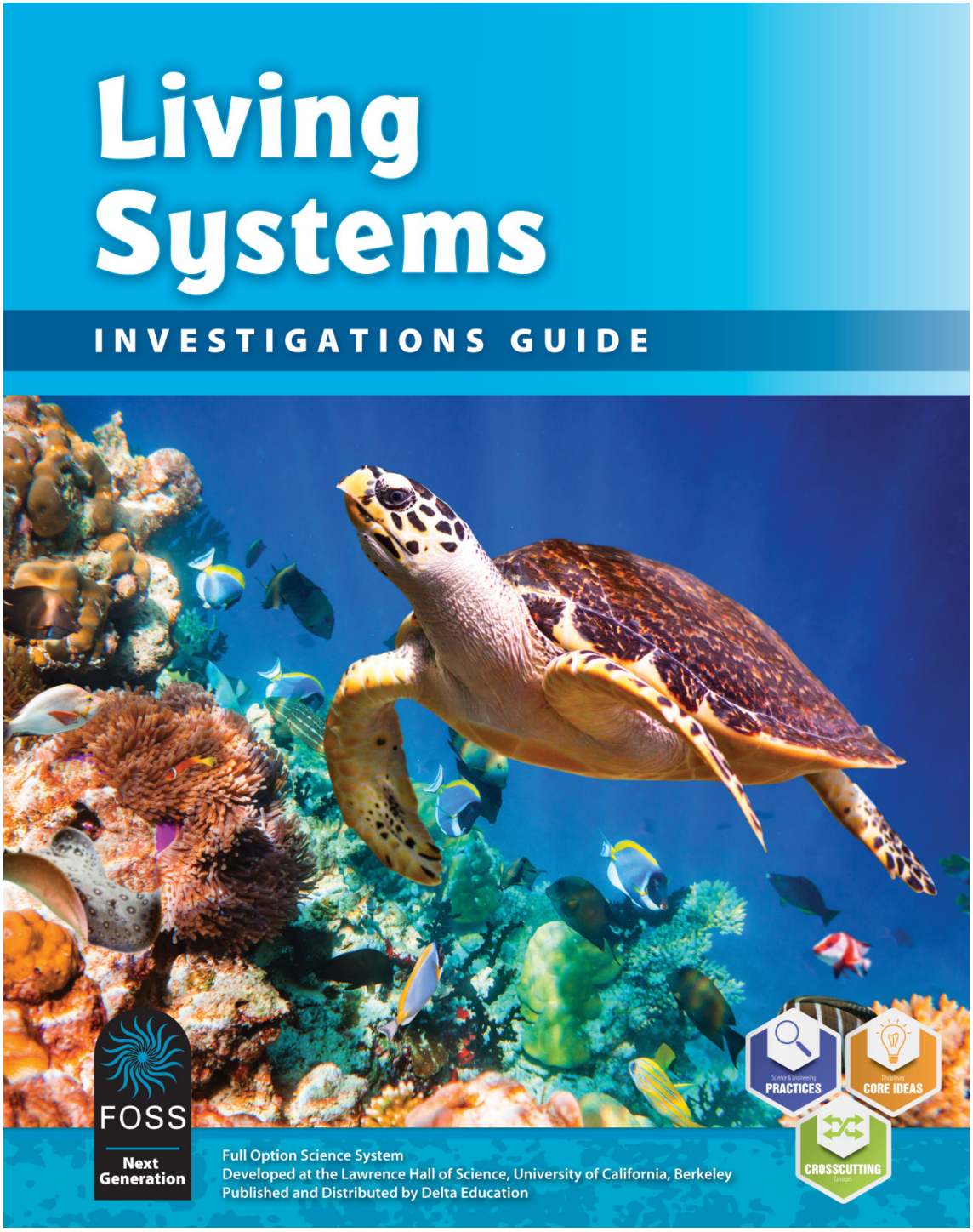


Investigation 1 - Systems

PART 1:
Everyday Systems

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

2 sessions

Student Notebooks:

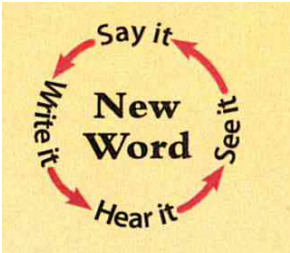
You are excepted to keep a **neat and organized** science notebook. Your notebook will be **collected and graded** as we go through the investigations. You will need your notebook to record observations, focus questions, ideas, and vocabulary.

- Make sure your name is on the front of your notebook.
- Number the **first ten pages** (#1 - #10) in the lower corner of the pages.
- On the first page, write **"Table of Contents"**.
- The first three pages will be saved for the Table of Contents.
- We will begin today's notes on page 4.

Introduction:

This is a **system** that has been designed for efficient transportation of clothes and other personal items while traveling.

- *What do we call this system?*
- Based on this example, (turn & talk), *What is a system?*
- *What are the elements or parts that make up this system?*



This symbol means that any time a new, bold vocabulary word is presented, we:

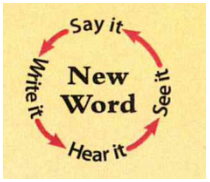
1. *Listen to the teacher say the word.*
2. *We repeat the word aloud.*
3. *We write the word and definition into our notebook.*

A **system** is any collection of interacting parts that work together to make a whole or produce or perform a function.

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

How can you identify a system?

Write this question on the top of page 4 in your notebook.



The word system has an important meaning in science. A system is any collection of **interacting** parts that work together to make a whole or produce or perform a function.

Brainstorm: What are the "*interacting parts*" that make the suitcase perform its function of transporting people's goods?

- Handles for rolling or lifting
- Main storage compartment
- Pockets for holding items
- Zipper for closing
- Wheels for rolling
- Luggage tag for identification
- Straps for holding items in place
- Manufacturer's logo

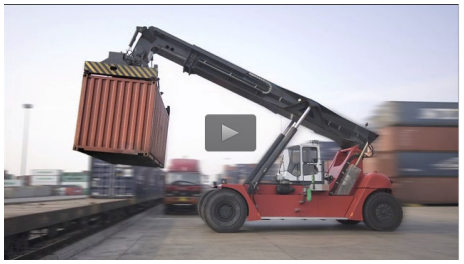
Did you think of any other interacting parts?

Discuss: Now think of a more complex system with interacting parts, how about a **railroad**!

A railroad is a <u>transportation system</u>. Railroad systems transport people and heavy products.

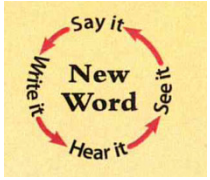
Turn & Talk: List some of the <u>interacting parts</u> of a railroad system.

- *Locomotive or engine*
- *Train cars*
- *Tracks*
- *Engineer or conductor*
- *Cargo or load*
- *Control center*



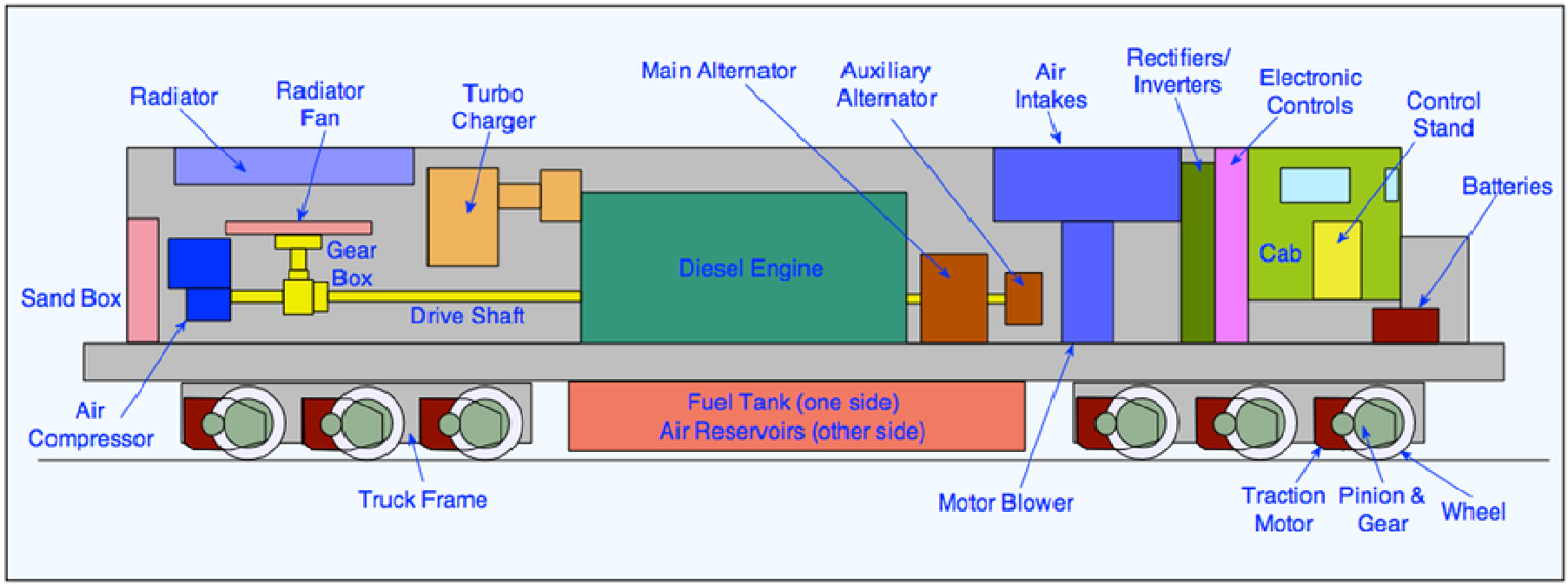
Some of the parts of the system are themselves systems. For instance, a locomotive that pulls the train is itself a complex system, including engines, generators, electric motors, wheels, lights, whistles, and controls (just to name a few!)

When a system is part of a larger system, the system inside the larger system is called a **subsystem**.



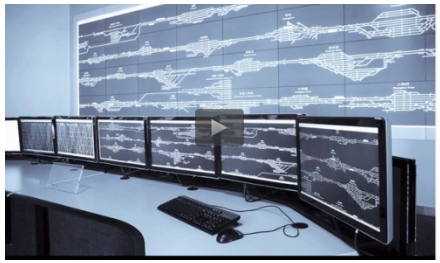
When a system is part of a larger system, the system inside the larger system is called a **subsystem**.

The locomotive is just <u>ONE</u> subsystem of a railroad.



The rails are another subsystem of a railroad.

= metal rails, wood planks, nails, gravel, etc.



Important:

The **sum of all the parts** = a railroad system. If any of the subsystems breaks down, the railroad system cannot accomplish its tasks of transporting people and goods.

Some systems are **COMPLEX** (lots of subsystems)
others are **SIMPLE** (few if any subsystems)

End session

Review What We Have Learned:

• A **system** is any collection of interacting parts that work together to make a whole or produce or perform a function.

• When a system is part of a larger system, the system inside the larger system is called a **subsystem**.

• You can identify a system by looking for **interacting** parts.

• If any of the subsystems breaks down, the overall system cannot accomplish its tasks and function.

• Some systems are **COMPLEX** (lots of subsystems) .

• Some systems are **SIMPLE** (few if any subsystems).

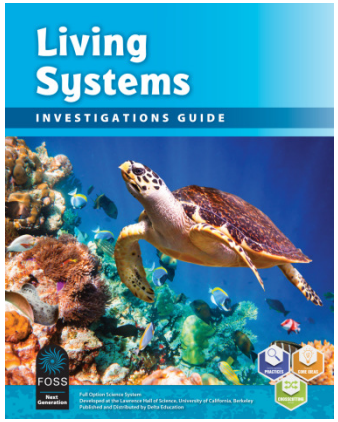
Small Group Task:

Pick one of the systems shown below. Tell us what the system is and share with the class the parts of the system, how the parts interact, and if the system has subsystems.

Share Out:

What is the system?
What are some of the parts of the system?
How do the parts interact?
Does the system have subsystems?



How can you identify a system?

Partner-Read "**Introduction to Systems**" - page 3 & 4.

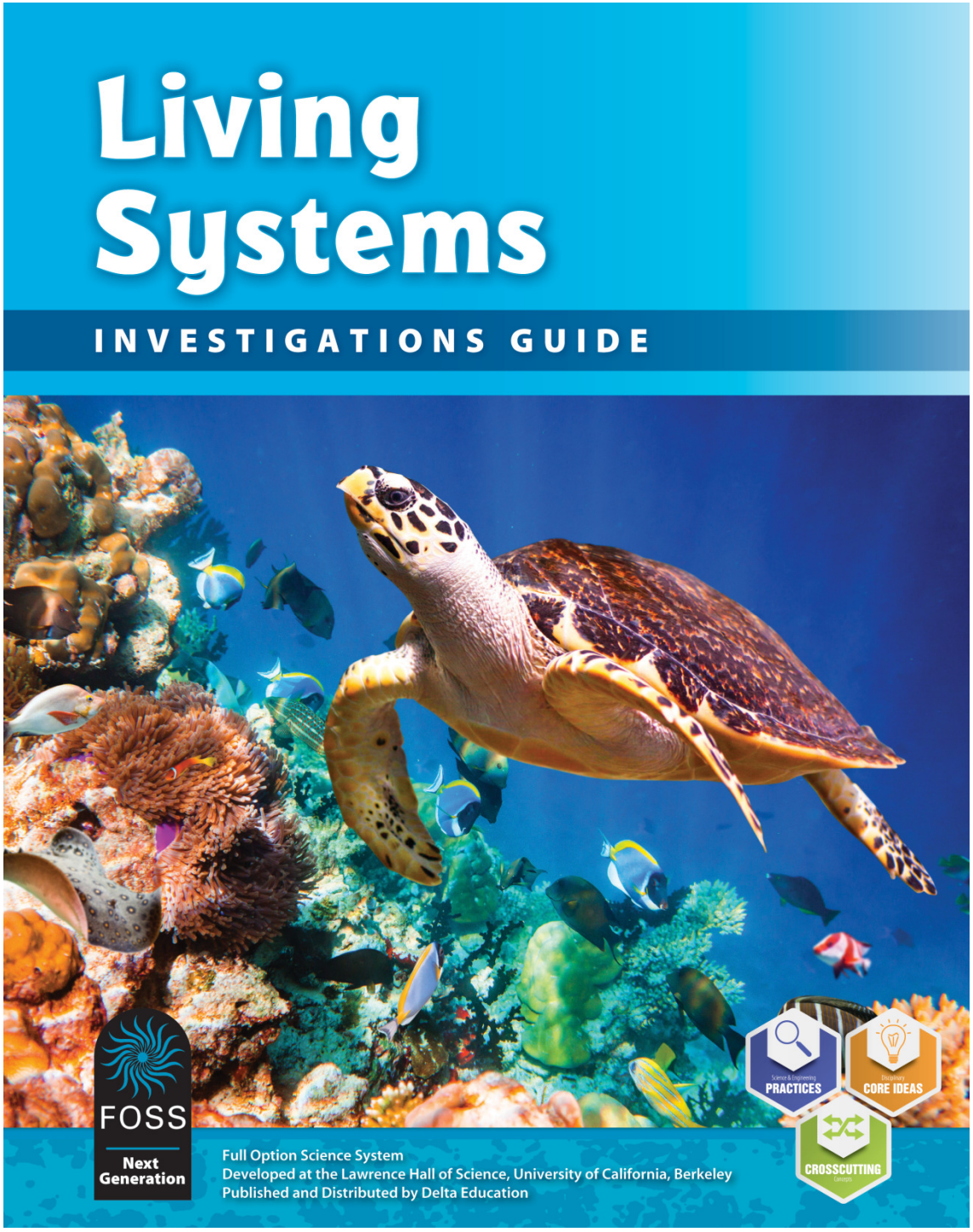
Answer the focus question above in your notebook.

Notebooks will be collected and graded.

A **system** is any collection of interacting parts that work together to make a whole or produce or perform a function.

Interact - when parts of a system work together to perform a function.

When a system is part of a larger system, the system inside the larger system is called a **subsystem**.



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.

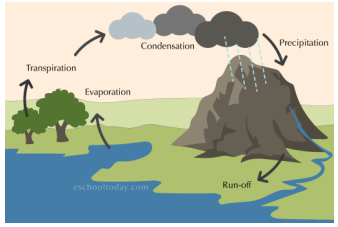
Is planet Earth a system?

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

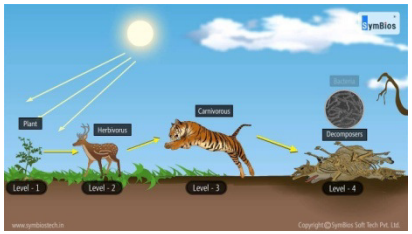
Geosphere: (sometimes called the lithosphere) is Earth's rocks, minerals, and landforms.

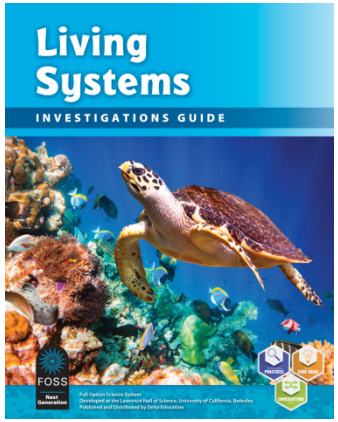
Atmosphere: is the gases surrounding Earth at a depth of up to several hundred kilometers.

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.

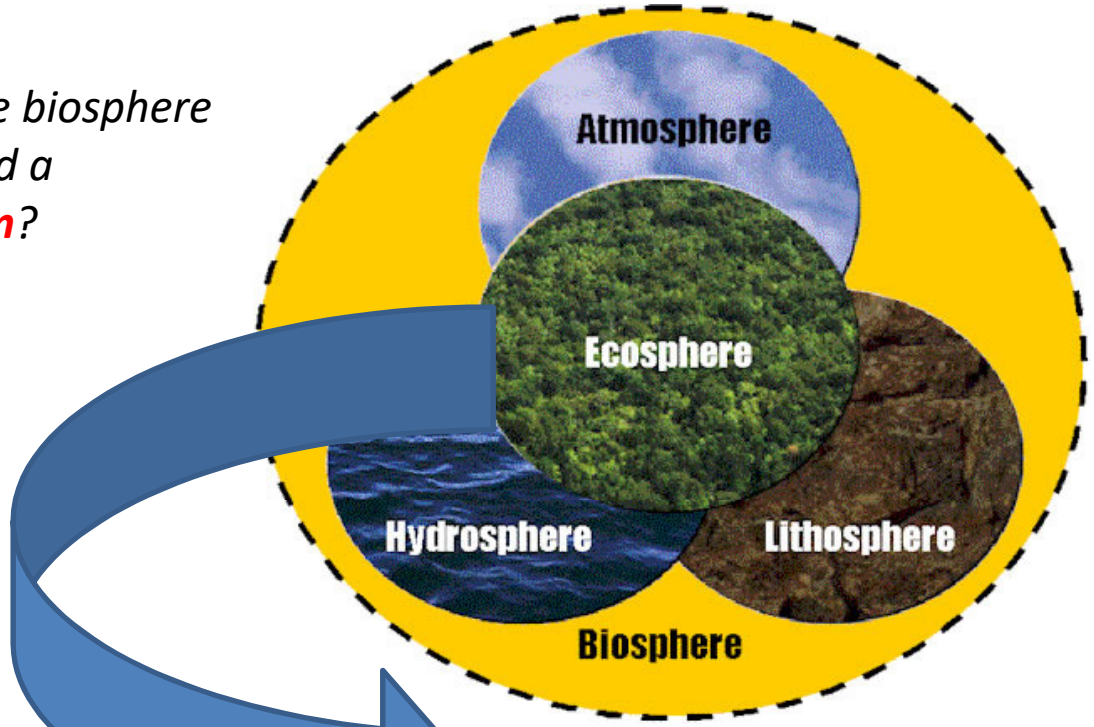
Hydrosphere: is the water on Earth on the rivers, lakes, seas, groundwater, oceans and atmosphere.

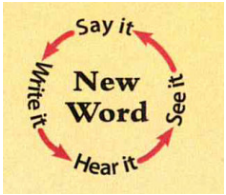
Biosphere: is all the plants, animals, and other living things in the water, on the land, and in the air.

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

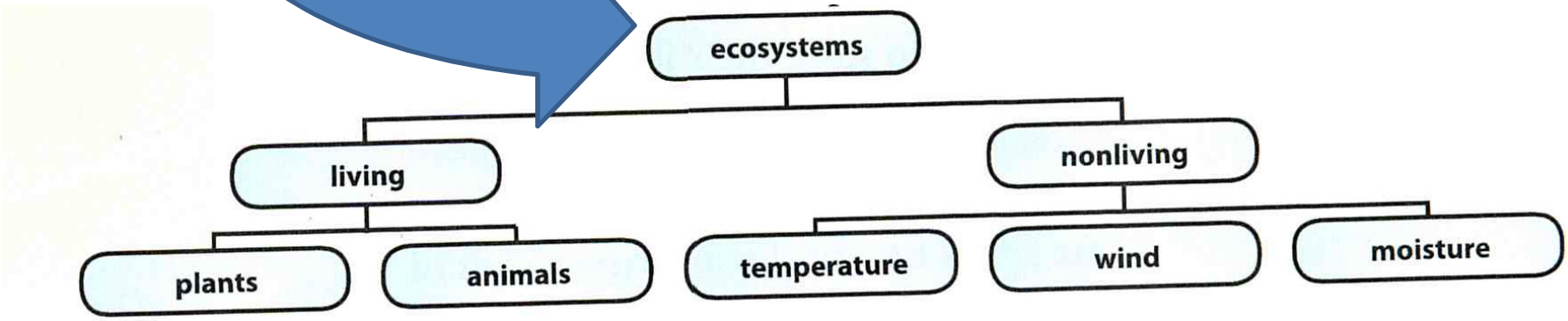
Biosphere: is all the plants, animals, and other living things in the water, on the land, and in the air.

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

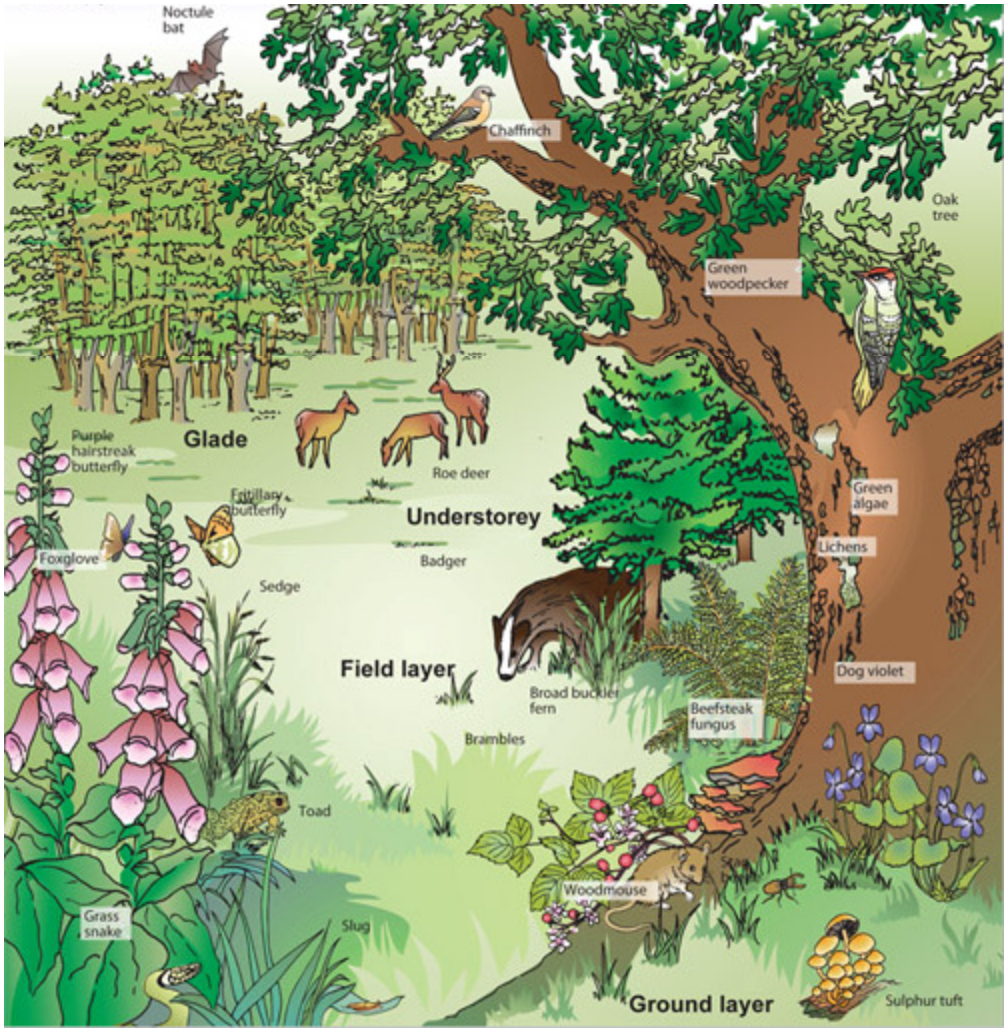




An **ecosystem** is complex community of organisms interacting with each other and with the nonliving environment.



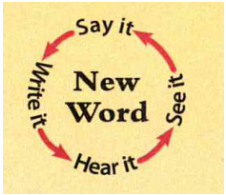
Ecosystem: is a complex system of organisms. Thousands of organisms living and nonliving interact in an ecosystem. A great example of an ecosystem is the woods.



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

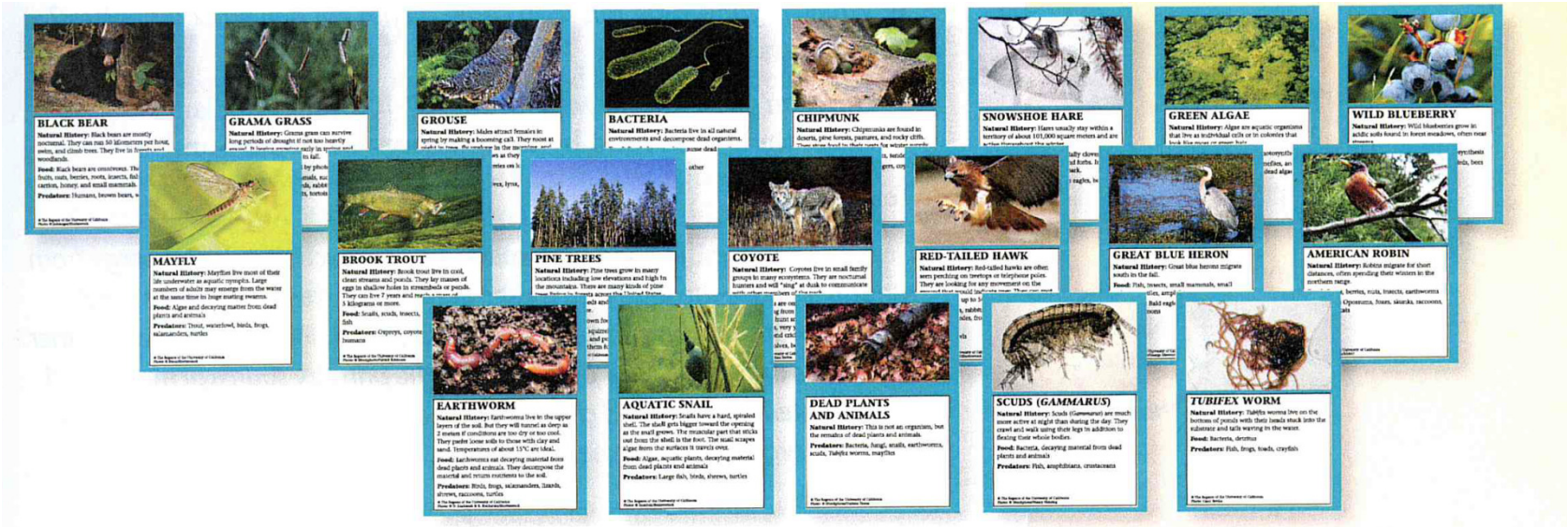
One way that organisms interact in the woods is through feeding relationships, that is referred to as a **food chain**.

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



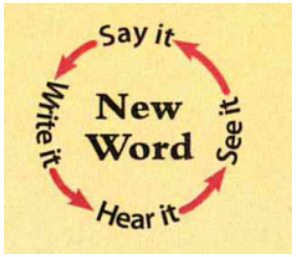
Food-web cards:

Each group will receive a packet of food web cards.

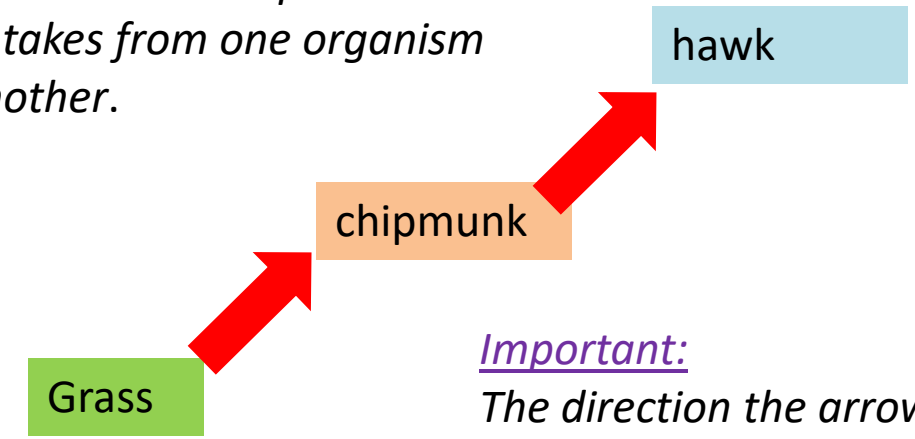


Task:

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.

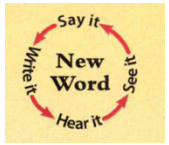


A **food chain** is the *path that food takes from one organism to another*.

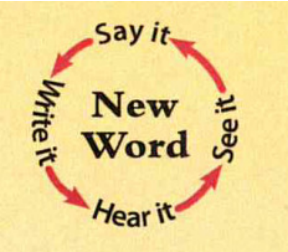


TASK:
Create a food chain of 3 organisms. Draw and label the food chain in your notebook.

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

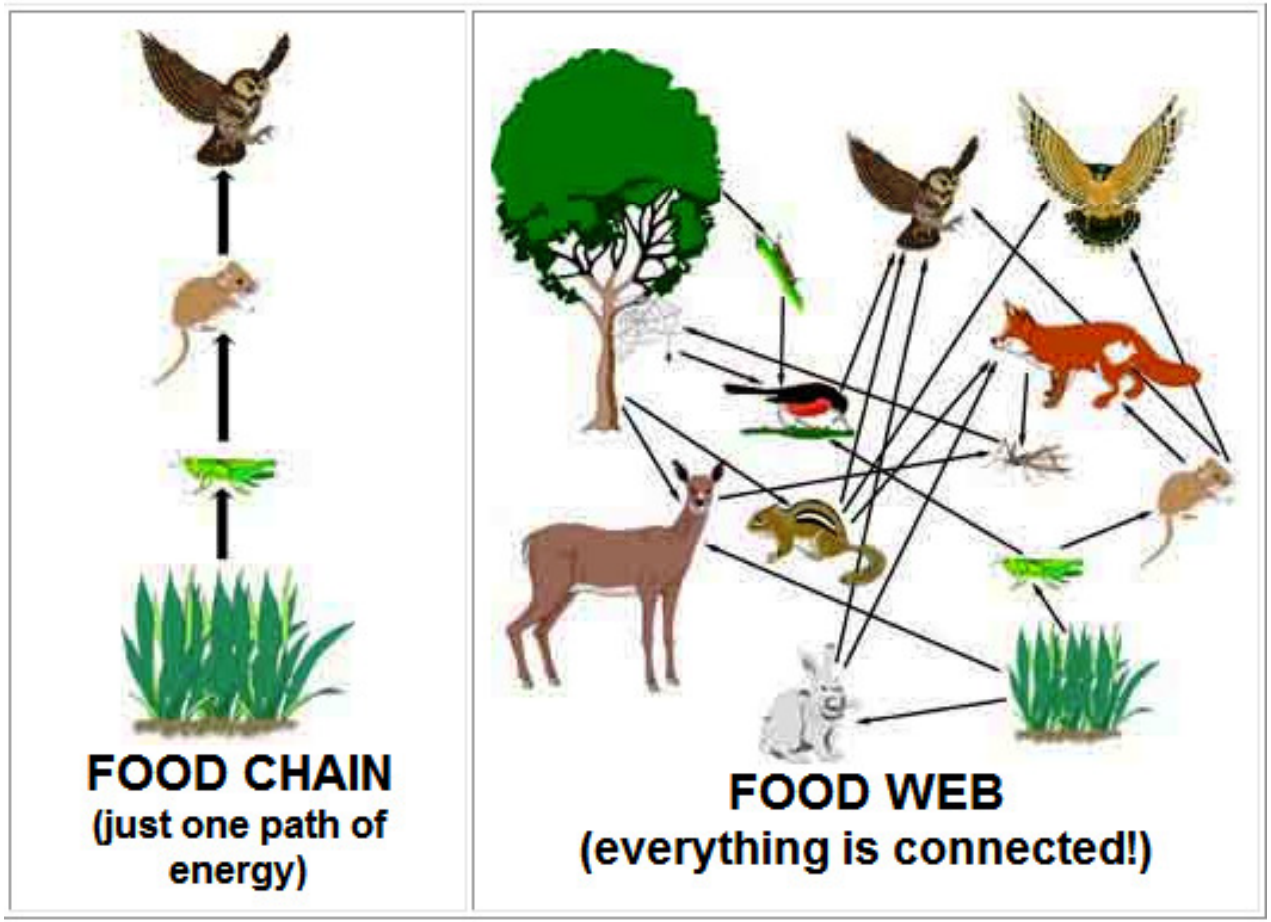


Producers	**Organisms, such as plants or algae, that makes its own food.**	**grass, algae, trees, wild berries**
Consumers	**Organisms that eat other organisms.** **Herbivores: animals that eat plants.** **Carnivores: animals that eat other animals .** **Omnivores: animals that eat both plants and animals.**	**bears, chipmunks, hawks, fish, coyote**
Decomposers	Organisms that break down plant and animal matter into simple chemicals.	bacteria

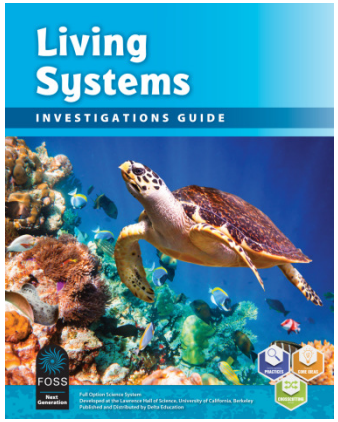


A **food web** shows ALL the paths of feeding relationships between all organisms in an ecosystem.

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.

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

- Notebooks will be collected and graded.

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.