Name: _____ #: _____

Food Webs

STEMscopes: A food chain is the potential path that energy and nutrients follow as they move through an ecosystem. Every organism in an ecosystem is a member of many food chains. The composite of all of the food chains within an ecosystem is called a food web.

Standards that will be addressed:

- **5-LS2.A.1**:The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food or other animals eat the animals that eat plants. Organisms can only survive in environments in which their needs are met.
- **5-LS2.1**: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Remember to look at the Science tab on our class website for additional resources, information, and updates.

Pages included in the packet:

1. Student Journal
2. Graphic Organizer
3. Weighing Air
4. STEMscopedia
5. Linking Literature:
    a. Round Table Discussion
    b. Comparison Diagram
    c. Ocean Energy
6. Explain Communicate (Biggest Impact)
7. Science Today (article assigned on STEMscopes)
8. Independent Practice
9. Concept Attainment Quiz

Optional Extension Activities:

- At Home Connection Piece (see class website)
- Web Surfing Science (see STEMscopes account)

Test Date & Journal Collection: _____

Name: _____ Date: _____ Group: _____

You Are What You Eat
Student Journal

Choose several food items to create a well balanced meal for either breakfast, lunch, or dinner.

Meal: _____

Food Items: _____

_____

_____

_____

Draw and label your plan for your mobile.

1. Were some energy paths longer than others? Why?

_____

_____

_____

2. Can you think of more than one food item that could come from the same energy path?

_____

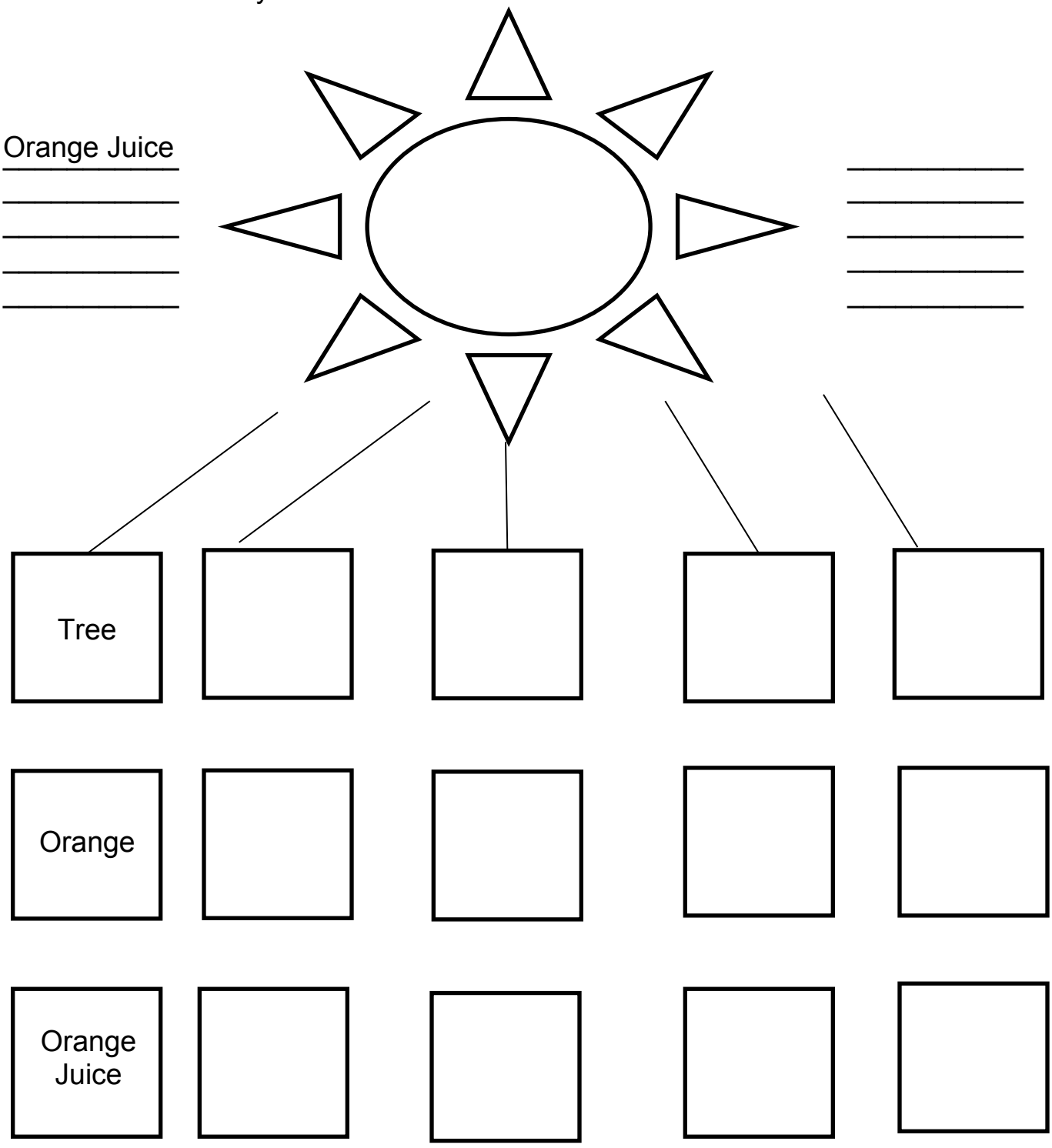
_____

Graphic Organizers

Name: _____ Date: _____ Group: _____

Food Webs

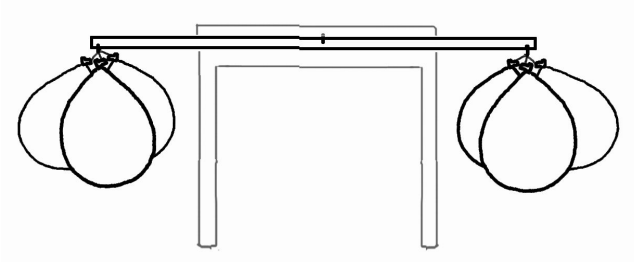
List food items that you have eaten today and then trace them back to the Sun. The first one is done for you.



Weighing Air

Name: _____

Right now, your set-up looks something like this. But soon your teacher will let out all the air from one side. What will happen? Answer the questions below, then find out!



MYSTERY science

1. Add arrows to the picture below to show how you think the scale will move if air DOES weigh something. Why do you think that?

_____

_____

_____

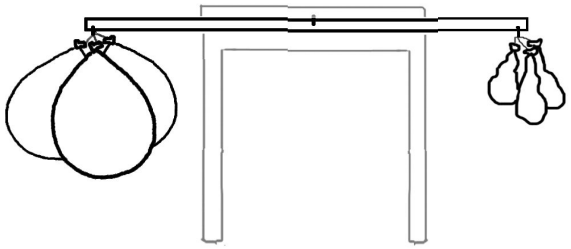
2. Add arrows to the picture below to show how you think the scale will move if air DOESN'T weigh anything. Why do you think that?

_____

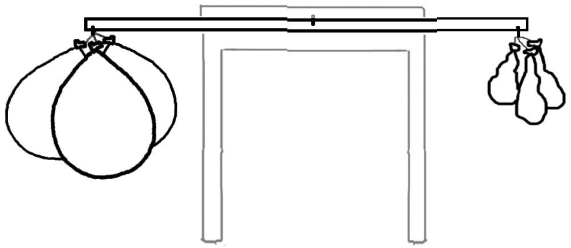
_____

_____

1



2



3. Which drawing did the experiment look like in the end? (Drawing 1 or drawing 2?) What does that mean about air?

_____

_____

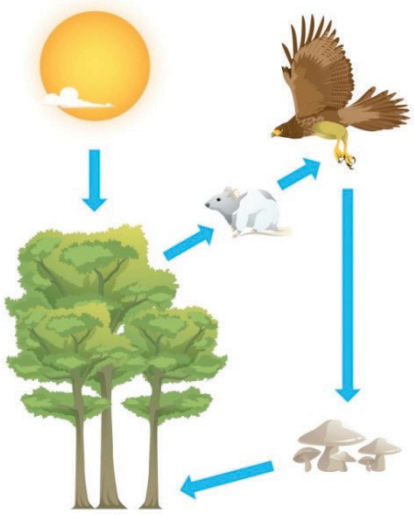
_____

Reflect

Imagine for a moment that you stay after school one day to clean up the classroom. While cleaning, you move some plants away from the sunny windows. A week later, you remember to move the plants back. You notice something strange has happened. Instead of standing upright, the plants appear to be leaning toward the windows! Why?

Plants need sunlight to survive. If a plant is moved away from sunlight, special cells in the plant help it turn back toward the Sun. The Sun's energy allows plants to produce their own food. Plants then use this food energy to grow and reproduce. But not all organisms can make their own food. How do other organisms get their food energy? Do they get it from the Sun?

Where do all food chains and food webs get their energy?
All of the food energy that passes between organisms comes from the Sun. You might be wondering how this is possible. After all, humans cannot eat sunlight! Plants and other organisms that can use sunlight first absorb it and then use that energy to make their own food. That energy passes to other organisms when they eat the plants. For example, grass uses sunlight to make food. A deer gets energy by eating the grass. After that, a wolf gets energy by eating the deer. The movement of food energy from one organism to another is called a *food chain.* Take a look at the food chain on the right. The arrows show how food energy is passed from one organism to the other. The plants use energy from the Sun to make their own food.



The mouse gets energy by eating plants. The hawk gets energy by eating the mouse. Organisms like mushrooms also help move energy through a food chain. They break down material from the hawk or other organisms once they die. Some of the material becomes part of the soil that is later used by plants. You will learn more about this process later in the lesson.

Look Out!

You might think the arrows in a food chain show which organism is eating another organism. The arrows actually show how energy is moving through the food chain.

What Do You Think?

Suppose a dust storm blocked sunlight in your town for several weeks. What do you think would happen to the plants in the area? What would happen to the organisms that depend on the plants for food? Why?

Reflect

What are the different parts of a food web?

A group of overlapping or connected food chains is called a *food web.* A food web *can* be big or small. It can contain many different types of plants and animals or just a few. Whether a food web is big or small, the organisms fall into one of two categories: producers or consumers.

carbon dioxide: a gas found in Earth's atmosphere

- **Producers:** Producers are organisms that get their energy directly from the Sun. Their cells are able to turn sunlight into food through a process called *photosynthesis*. In photosynthesis, producers combine **carbon dioxide,** water, and sunlight to produce oxygen and sugar (their food). Other organisms get energy by eating producers. Have you ever eaten lettuce or any other vegetable? If so, you have eaten a producer! The lettuce plant converts sunlight into food your body uses as fuel. Producers are very important to life on Earth. Without them, other organisms would not survive.

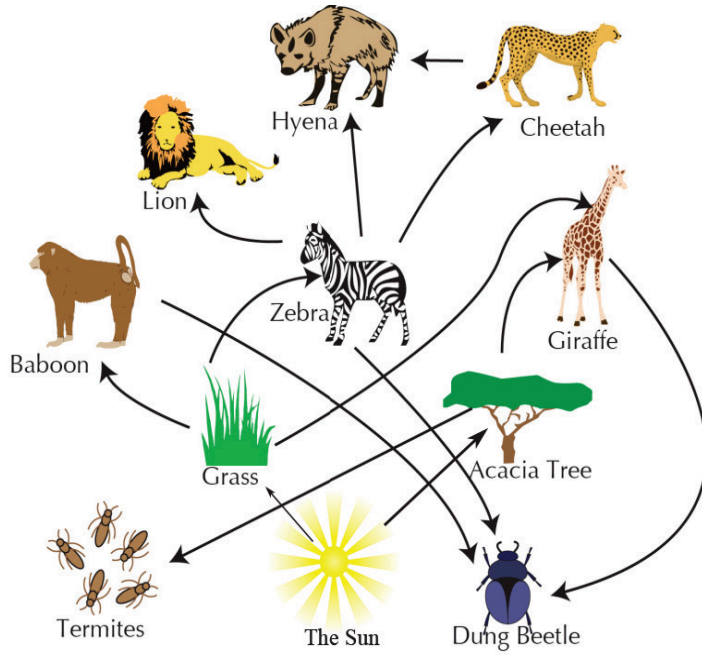
- **Consumers:** A bald eagle is an example of consumer. It cannot directly use the Sun's energy to make food. As a consumer it has to eat (or consume) other organisms for energy. A consumer may eat producers (such as a deer) or a consumer may eat other consumers (such as the bald eagle). Animals, fungi, and some bacteria are types of consumers. Consumers that eat only plants are called *herbivores*. Consumers that eat only animals are called *carnivores*. If a consumer eats both plants and animals, it is called an *omnivore*.

Some consumers are called *decomposers.* Mushrooms are decomposers. This group of consumers eats only dead organisms. They break down the nutrients in the dead organisms and return them to the food web. They may eat dead producers or consumers. Suppose a tree dies in a forest. Bacteria and fungi, like mushrooms, consume the tree and return the nutrients in the tree to the soil. The grass in the forest absorbs those nutrients and uses them to grow.

Reflect

How does the energy flow from one organism to the next in a food chain or web?

The movement of energy in a food chain or web is similar to a one-way street. The energy flows in one direction from one organism to another. It does not flow backwards. For example, in the food web on the right, the zebra gets energy directly from the grass it eats. The grass does not get energy from the zebra. When the zebra dies, a decomposer such as a dung beetle will break its body down into nutrients that the grass can use. Remember, the initial source of all this energy is the Sun.



A food web can include many connections. In the food web here, you can see that several animals rely on the zebra as a source of food. The lion, hyena, and cheetah all hunt the zebra. No matter how many connections a food web has, energy flows from the Sun to producers, and from producers to consumers. Decomposers help return energy from producers and consumers back to the food web.

ecosystem: all the interacting living and nonliving parts of an environment

Career Connection: Wildlife Biologist

Do you like spending time outside? Do you like watching animals? Then a career as a wildlife biologist might be right for you! Wildlife biologists research the natural world. For example, a wildlife biologist may study a tropical reef **ecosystem**. She keeps track of the different organisms living on the reef and the number of each type that live there. It is very important for a wildlife biologist to understand the food webs in the ecosystems she is studying. Suppose all producers in a reef died. Many of the fish that depend on the producers for food would be affected too. Wildlife biologists try to find ways to keep food webs and ecosystems healthy and stable.

Try Now

What kind of consumer are you? Complete this activity to find out.

1. First, make a list of all the food items you ate for dinner last night.

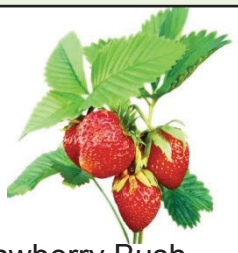
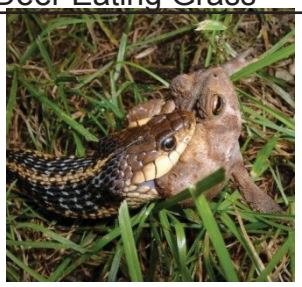
2. Then record whether the food items came from plants or animals.
   a. Which food items were vegetables or fruits? These came from plants.
   b. Which food items were meats, cheese products, or mushrooms? These came from animals and fungi.
   c. Some foods are a mixture of plant and animal sources. For example, a biscuit is made from flour, which comes from a plant. It also has milk and butter, which comes from an animal (a cow). Write down all the sources you can think of for each ingredient.

3. Look at your list. Did you eat more food items from plants or from animals and fungi?

4. Now that you have taken a look at what you ate, would you call yourself a carnivore? An herbivore? An omnivore? Explain your answer.

Try Now

Study the images in the table below. Decide if the organism in each image is a producer or consumer. Write your answer in the first column of the table. If the organism is a consumer, decide if it is a carnivore, herbivore, or omnivore. Write your answer in the second column of the table. Finally, think about how each organism gets its food energy. Write your answer in the last column of the table. The first two answers have been completed for you.

Organism	Is the organism a producer or a consumer?	Is the organism a carnivore, herbivore or omnivore?	How does the organism get food energy?
 Strawberry Bush	producer	not a consumer	
 Deer Eating Grass			
 Snake Eating a Frog			
 Raccoon Eating Plants and Animals From a Trash Can			

Name: _____ Date: _____ Group: _____

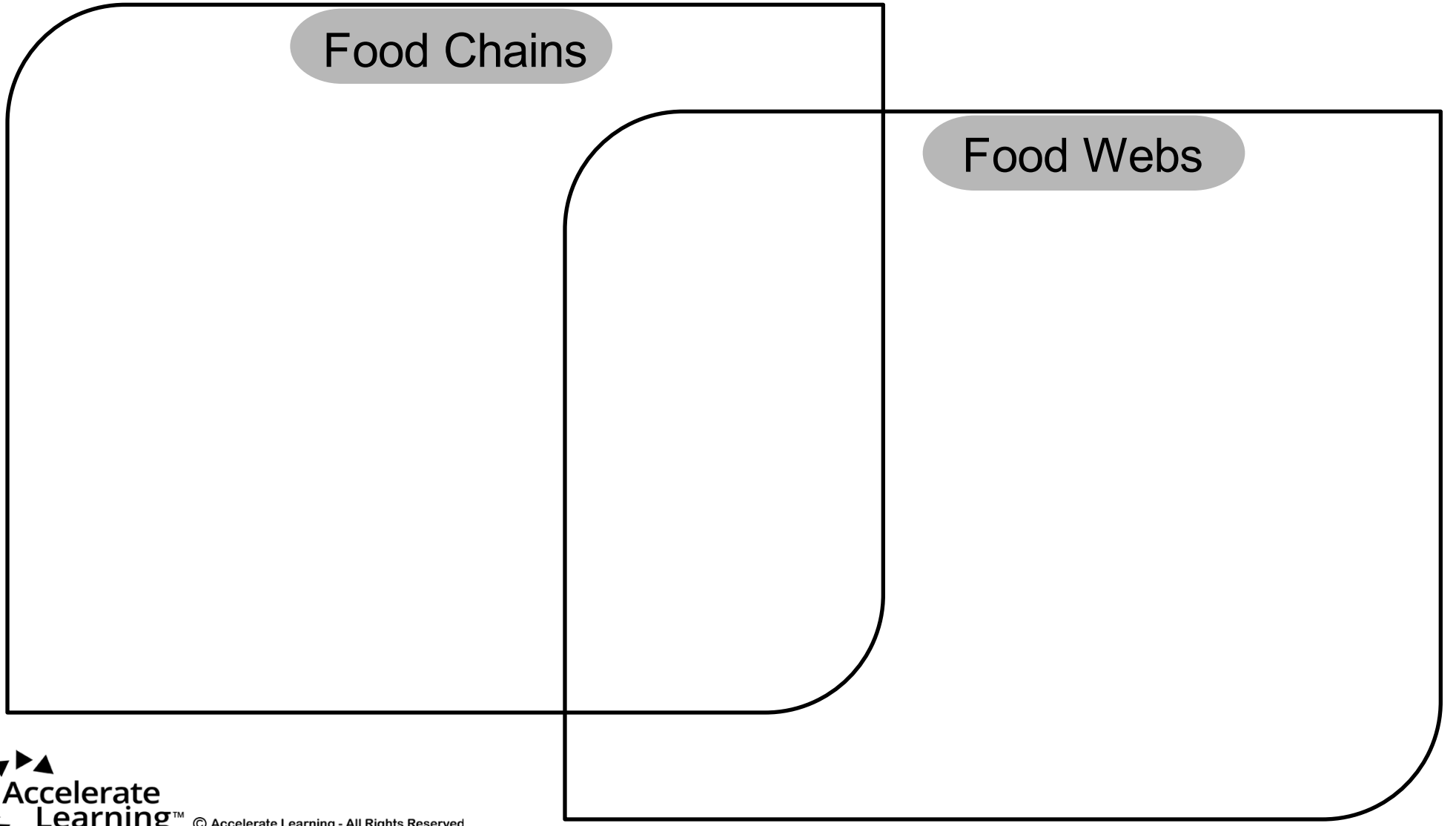
Food Webs Round Table Discussion

Question	What Do You Think?	Why Do You Think That?	What Is Your Evidence?	Group Consensus
1. Where do all food chains and food webs get their energy?				
2. What do the arrows in a food chain or food web represent?				
3. How does the energy flow from one organism to the next in a food chain or food web?				
4. What are the different parts of a food web?				

Linking Literacy

Name: _____ Date: _____ Group: _____

Food Chains and Food Webs Comparison Diagram



Name: _____ Date: _____ Group: _____

Ocean Energy

Directions: Describe the transfer of energy you see in the Ocean Energy picture. Include the words: energy, producer, consumer, and decomposer in your description.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Explain: Communicate

Name: _____ Date: _____ Group: _____

Driving Question
What would have the largest impact on the food web in our ecosystem?

Discussion Goals:

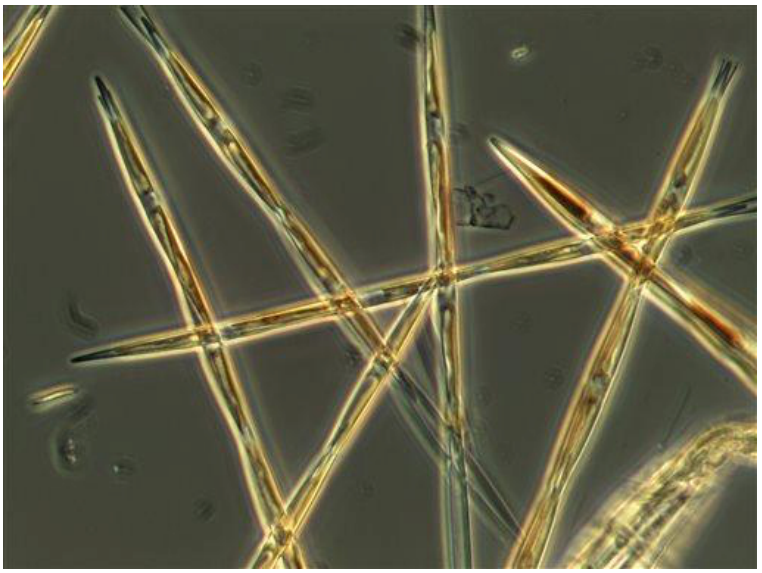
- Support your decision with evidence.
- Include information about:
  - Why you think the scenario you picked will have the largest impact; and
  - What could be done to help the ecosystem recover.

Scenario I picked: _____

Why Will It Have the Biggest Impact on the Food Web in Our Local Ecosystem?

What Can Be Done to Help the Ecosystem Recover?

Toxic Algae Bloom



Caption

Algae named Pseudo-nitzschia produces the toxic domoic acid. This photo shows the algae bloom sample that the NOAA ship Bell M. Shimada collected. The NOAA surveyed the bloom this summer on the West Coast. One of the largest toxic algae blooms recorded off the West Coast is much denser that before. It is more widespread and may extend deeper than first thought say scientists who surveyed the event aboard a National Oceanic and Atmospheric Administration research vessel. (NOAA Fisheries via AP)

Toxic algae blooming in warm water from California to Alaska

PHUONG LE
Associated Press

SEATTLE (AP) — A vast bloom of toxic algae has shown up off the West Coast since May. It is denser, more widespread and deeper than scientists feared even weeks ago.

This coastal ribbon of minuscule algae is up to 40 miles wide. It is 650 feet deep in places. It is healthy among the unusually warm Pacific Ocean temperatures. It now stretches from at least California to Alaska. It has shut down wealthy fisheries. Shellfish managers on Tuesday closed off part of Washington's coast. They found elevated levels of marine toxins in crab meat.

So-called "red tides" are caused by the color the algae turns the water. Red tides are cyclical. They have happened many times before. However, ocean researchers say this one is much larger. It's also lasting much longer. It has high levels of neurotoxins. These bring severe costs for the Pacific seafood industry. Coastal tourism and marine ecosystems are also affected.

Dan Ayres is a coastal shellfish manager for the Washington Department of Fish and Wildlife. Mr. Ayres reports the area now closed to crab fishing includes more than half the state's 157-mile-long coast. This affects the year's crab season, bringing it to an early end.

"We think the algae is just sitting out there," said Anthony Odell. Mr. Odell is a University of Washington researcher who is surveying the harmful algae. "It's farther offshore, but it's still there."

The survey data should provide a clearer picture of what is causing the bloom. The bloom is brownish in color. This is different compared to the blue and green algae found in polluted freshwater lakes. Marine detectives already have a suspect. They believe a large patch of water is warmer than the rest of the water by 3 degrees centigrade. Scientists have nicknamed the patch of water "the blob".

"The question on everyone's mind is whether this is related to global climate change. The simple answer is that it could be. At this point, it's hard to separate the differences in these cycles," said Donald Boesch. Mr. Boesch is a professor of marine science at the University of Maryland. He is not involved in surveying the data. "Maybe the cycles are more extreme in the changing climate."

"There's no question that we're seeing more algal blooms more often. We're seeing them in more places when they do occur. They're lasting longer and often over greater areas. We're seeing more events than decades ago," said Pat Glibert. Pat is a professor at Horn Point Laboratory.

Odell recently completed the first leg of the survey. He completed it mostly in California waters. On Wednesday, researchers plan to continue monitoring the sea between Oregon and Seattle. The survey boat will then go to Vancouver Island. It will finish surveying in early September. Another research ship is taking samples off Alaska.

The brownish bloom was particularly thick off the coast of Santa Barbara, California. Odell said it was unusually dominated by one type of algae. The algae is called Pseudo-nitzschia. It can produce the neurotoxin domoic acid.

"It's a sign of an imbalance. Too much of any one thing is not healthy for anybody to eat," said Vera Trainer.

Trainer said this bloom is the worst she's seen in 20 years of studying them. Harmful algal blooms have usually been limited to one area of the ocean. They have usually disappeared after a few weeks. This one has grown for months. It gets larger and smaller. It never goes away.

"It's been incredibly thick. It’s almost all the same organism and looks like a layer of hay," said Raphael Kudela, a professor of ocean sciences.

The current bloom also involves some of the highest concentrations of domoic acid yet observed in Monterey Bay and other areas of the West Coast.

"It's really working its way into the food web. We're definitely seeing the impacts of that," Kudela said. “The sea lions are getting sick. The pelicans are unprotected. Now that the Pacific is experiencing its periodic ocean warming known as El Niño, it may come back even stronger next year,” he said.

Domoic acid is harmful to people. It’s harmful to fish and marine life. It collects in anchovies and sardines. Other small fish are affected, as well as shellfish that eat the algae. Marine mammals and fish-eating birds in turn can get sick from eating the contaminated fish. In people, it can trigger shellfish poisoning. It can cause permanent loss of short-term memory in severe cases.

State health officials stress that seafood bought in stores is still safe to eat. This is because it is regularly tested. There have been no reports of human illnesses linked to this year's bloom. However, authorities aren't taking chances in fisheries with dangerous toxin levels.

California public health officials have warned against eating mussels and clams people have caught themselves. They also say to stay away from any anchovy. Sardines or crabs are also warned against. Other shellfish harvests are shut down along Oregon's coast.

The most recent samples showed the highest-ever recorded levels of domoic acid in the internal organs of Dungeness crab, Ayres said.

"This is really unique territory for us," said Ayres.

Name: _____ Date: _____ Group: _____

What Do You Think?

1. Humans do not eat the algae directly from the ocean, so how can we still be affected by it?

_____

_____

_____

2. The article mentioned sea lions and pelicans getting sick because of the algae, but they eat fish, not algae. Draw and label a food web in the space below to show how the algae can still affect sea lions and pelicans.

Independent Practice

Name: _____ Date: _____ Group: _____

Part I: Four Square Model

Directions: Fill in the four sections of the model to describe the vocabulary word or phrase.

Definition	**Picture**
Food Web	
Examples	**Nonexamples**

Definition	**Picture**
Decomposer	
Examples	**Nonexamples**

Definition	**Picture**
Consumer	
Examples	**Nonexamples**

Definition	**Picture**
Organism	
Examples	**Nonexamples**

Independent Practice

Name: _____ Date: _____ Group: _____

Part II: Word Find

Directions: Read the clue and find the correct word in the box.

R	G	N	D
A	I	E	F
Y	G	N	U
F	B	S	L

1. Can break down almost any type of matter.

L	U	T	B
R	F	E	D
E	S	C	O
W	O	P	M

2. Consumes nonliving biomass.

S	A	O	M
A	G	R	P
N	I	Y	L
H	S	M	T

3. A self-contained living thing.

D	Y	C	I
S	N	O	B
U	M	M	N
Y	E	R	A

4. Gets energy from eating other organisms.

Concept Attainment Quiz

Name: _____ Date: _____ Group: _____

I. Vocabulary Matching

____ The ability to make things move	A. Producer
____ An organism that feeds on dead plants and animals and their waste	B. Consumer
____ An organism that changes sunlight into a usable form of energy	C. Decomposer
____ Interconnected food chains	D. Energy
____ An organism that feeds on producers	E. Food web

II. Identification

1. Using the following words, sketch the food web that links all of the following: Sun, gazelle, grass, lion, bacteria, zebra.
2. Label each part in the food web as a producer, consumer, or decomposer. Each term must be used **at least** once.

Be sure your arrows start at the Sun and point to where energy is transferred!