

Food Chains

A Closer Look at the Links to Survival

Students know that some animals eat meat and some eat plants. However, students might not understand how organisms interact and affect one another. The *Food Chains* Teacher Guide is designed to facilitate student comprehension of this essential life science concept. By using this guide, you have an opportunity to tap into high student interest while exposing students to broader science concepts.

Participation in these lessons will lead students to make global connections and understand higher-level concepts such as the delicate balance of nature and the role humans play in both protecting and destroying the environment. Students will become aware of how energy passes from the sun to producers to several layers of consumers and finally to humans, the organisms often at the top of the food chain. They will realize that each link of the food chain—from plants to scavengers to decomposers—is vital to our survival.

The lesson plans in this guide are tailored for grades 2-4 and address various subjects, such as the humanities, biology, and ecology. Each lesson plan is designed to stand alone. As such, they do not need to be presented in sequential order. Helpful reproducible worksheets appear at the end of this guide. The book titles referenced in this guide include:

Australian Outback Food Chains

Prairie Food Chains

Coral Reef Food Chains

Rainforest Food Chains

Desert Food Chains

Savanna Food Chains

Food Chains and You

Seashore Food Chains

Forest Food Chains

Tundra Food Chains

Meadow Food Chains

Wetland Food Chains

As students investigate the topics addressed in the guide and become more aware of their place in the life cycles around them, they will sharpen their critical thinking skills and work toward protecting food chains for future generations. We invite you to jump in and ask questions with your class as you have fun learning more about food chains and food webs.



National Standards Correlation

Lesson Plan Title	Correlation to National Standards
From Chains to Webs	Science Students should develop the abilities necessary to do scientific inquiry. Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.
Where Are You in the Food Chain?	Science Students should develop the abilities necessary to do scientific inquiry. Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.
Don't Break the Chain	Language Arts Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes. Science Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.
Food Chain Adventure	Science Students should develop the abilities necessary to do scientific inquiry. Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.

Lesson Plan Title	Correlation to National Standards
Hungry, Hungry Herbivores	<p>Science</p> <p>Students should develop the abilities necessary to do scientific inquiry. Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.</p>
Catch Me If You Can!	<p>Science</p> <p>Students should develop the abilities necessary to do scientific inquiry. Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.</p> <p>Social Studies</p> <p>The learner can work independently and cooperatively to accomplish goals.</p>
Building the Energy Pyramid	<p>Science</p> <p>Students should develop an understanding of transfer of energy. Students should develop an understanding of organisms and environments.</p> <p>Social Studies</p> <p>The learner can work independently and cooperatively to accomplish goals.</p>
Let's Hear It for Worms!	<p>Language Arts</p> <p>Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.</p> <p>Science</p> <p>Students should develop an understanding of organisms and environments. Students should develop an understanding of changes in environments.</p>

For state specific educational standards, please visit <http://www.crabtreebooks.com/>.

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Overview and Scope of Lesson Plan Activities

Lesson Plan Title	Subject Areas	Major Concepts
From Chains to Webs	Art Biology Ecology	<ul style="list-style-type: none"> • food chains and food webs • interdependence of organisms in a shared habitat
Where Are You in the Food Chain?	Biology Ecology	<ul style="list-style-type: none"> • food chains and food webs • energy transfer
Don't Break the Chain	Biology Ecology	<ul style="list-style-type: none"> • interdependence of organisms in a shared habitat • effects of pollution and development on habitats
Food Chain Adventure	Biology Ecology Writing	<ul style="list-style-type: none"> • food chains and food webs • adaptations in organisms • interdependence of organisms in a shared habitat
Hungry, Hungry Herbivores	Biology Ecology	<ul style="list-style-type: none"> • food chains and food webs • interdependence of organisms in a shared habitat
Catch Me If You Can!	Biology Ecology	<ul style="list-style-type: none"> • predator-prey relationships • interdependence of organisms in a shared habitat
Building the Energy Pyramid	Biology Ecology	<ul style="list-style-type: none"> • energy transfer • energy pyramid
Let's Hear It for Worms!	Biology Ecology	<ul style="list-style-type: none"> • decomposition • interdependence of organisms in a shared habitat

Pacing Chart and Vocabulary

One class period is approximately 40 minutes.

Lesson Plan Title	Pacing	Vocabulary	Assessment
From Chains to Webs	1–2 class periods	carnivore consumer food chain food web herbivore omnivore producer temperate forest	Check reproducibles for proper placement of organisms and overall accuracy of chains and webs.
Where Are You in the Food Chain?	1 class period	carnivore consumer herbivore omnivore predator	Check reproducibles to see that food chains are listed correctly.
Don't Break the Chain	1–2 class periods	coral reef food chain food web species	Evaluate bumper stickers for persuasiveness, creativity, and neatness.
Food Chain Adventure	2 class periods	adaptation food chain food web habitat	Evaluate reproducibles and brochure pages for accuracy and completeness of information.
Hungry, Hungry Herbivores	1-2 class periods	browser grazer herbivore predator	Evaluate students' reproducibles with the corresponding rubric.
Catch Me If You Can!	2 class periods	carnivore herbivore predator prey	Make sure students can define <i>predator</i> and <i>prey</i> and explain the relationship between the two.
Building the Energy Pyramid	1 class period	consumer energy pyramid producer	Observe student participation and review reproducibles for accuracy and neatness.
Let's Hear It for Worms!	2 class periods	decomposer detritus	Evaluate students' posters for accuracy, completeness of information, and clarity of message.

From Chains to Webs

A Lesson on How Organisms Form Food Chains and How Food Chains Form Food Webs

Content

Students will identify organisms in a temperate forest habitat and determine how these organisms form food chains and food webs.

National Standards

The following standards will be addressed in the lesson:

Science

Students should develop the abilities necessary to do scientific inquiry.

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Interpersonal



Logical-Mathematical



Naturalist

Visual-Spatial

Prerequisites

Read *Forest Food Chains* with students, paying special attention to the section on food webs. Review *food chains* (the pattern of eating and being eaten for energy) and *food webs* (interacting food chains) before proceeding with the lesson.

Materials

- classroom map
- whiteboard and markers
- *Forest Food Chains* books
- student copies of the *From Chains to Webs* reproducible
- colored pencils or crayons

Instructional Procedure

Anticipatory Set

Explain to students that temperate forests are found throughout North America. Show students this area on the map. Summers are warm and winters are cold. The leaves of temperate forests' trees change color before falling off in Autumn. Point to pictures of temperate forests on pages 5, 12, and 13.

Class Discussion

Ask: *What plants and animals are found in a temperate forest?* Have students use their books to help them name the organisms. Make a list on the board. Discuss how these organisms get their food. Ask: *Are these animals producers or consumers?* Label the organisms on the board as **P** (producer) or **C** (consumer). Define the terms *herbivores*, *carnivores*, and *omnivores*. Label the animals on the board as **H** (herbivore), **C** (carnivore), or **O** (omnivore).

Objectives

The student will be able to...

- explain the difference between a food chain and a food web
- identify organisms found in a temperate forest and categorize them as producers or consumers
- show how these organisms form individual food chains and a combined food web

Activity

Distribute the *From Chains to Webs* reproducible. With students, choose organisms from the list on the board and place those organisms in a food chain of three links. Have students write the names of the organisms on the reproducible. Place students into pairs. Have each pair complete a second food chain using three other organisms on the board and write it on the reproducible.

Ask a volunteer pair to write their food chain on the board. Together with students, create a food web using the first food chain you created with students and the pair's food chain. Have students draw this web on the back of their reproducible. Encourage students to use colored pencils or crayons to enhance their pictures.

Accommodations and Extensions

For English-language learners, use pictures whenever possible and repeat key concepts and vocabulary.

As an extension, students can challenge themselves to create another food web using the food chain everyone created and the food chains each pair created.

Closure

Review with students that all plants and animals—including humans—are part of many different food webs.

Assessment

Check reproducibles for proper placement of organisms and overall accuracy of chains and webs.

Where Are You in the Food Chain?

A Lesson on How Humans Fit into Nature's Food Chains and Food Webs

Content

Students will gain an understanding of how humans fit into a food web by using what they eat to determine their own food chains.

National Standards

The following standards will be addressed in the lesson:

Science

Students should develop the abilities necessary to do scientific inquiry.

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Interpersonal



Naturalist



Visual-Spatial

Prerequisites

Read books in the *Food Chains* series with students. Make sure students have a good understanding of the elements that make up food chains and food webs, the movement of energy from one level to another in a food chain, and factors that can cause changes in food chains.

Materials

- *Food Chains* books
- student copies of the *Where Are You in the Food Chain?* reproducible
- pencils

Instructional Procedure

Anticipatory Set

Review the terms *herbivore*, *carnivore*, *omnivore*, and *predator*. Give students examples of each type of animal. Explain to students that humans are usually considered the “top of the food chain,” which means they are rarely eaten by predators. Tell students that an omnivore diet gives humans a variety of ways to get energy. Explain that students will list the items they ate during one meal to determine what kind of consumer they are in a particular food chain.

Class Discussion

Ask: *Where do you belong in the food chain?* Explain that humans can be on all levels of the energy pyramid. We are primary consumers when we eat anything plant-based (bread, pasta, vegetables, fruit, etc.). We are secondary consumers when we eat the meat or products of an herbivore (beef, milk, cheese, etc.). We are tertiary consumers when we eat carnivores and omnivores (pigs, chicken, eggs, turkey, fish, etc.). We also eat scavengers and decomposers such as lobster, shrimp, and mushrooms. Draw a diagram on the board to illustrate this concept.

Objectives

The student will be able to...

- explain the three levels of a food chain: plants, herbivores, and carnivores
- chart where energy comes from in one's own diet

Activity

Distribute copies of the *Where Are You in the Food Chain?* reproducible for students to work on in small groups. Have each student tell the group members everything he or she ate or drank at one meal yesterday. Have all students in the group write down these foods on the reproducible. Remind them to include things like ketchup or mayonnaise. Using the examples on the reproducible, show students how to create a food chain for each item and put the student at the end of it. Explain that this will show what level of consumer the student was for that food. Students may need to look up whether some animals are *herbivores*, *carnivores*, or *omnivores*. When the groups have completed the reproducible, ask them to share their answers with the class.

Accommodations and Extensions

As an extension, students can take all their food chains and turn them into a food web with your help.

Closure

Hold a class discussion about what students discovered from the exercise. Point out that while we get more energy from plant-based foods (carbohydrates), we also get important nutrients, such as protein, from other foods that are low in carbohydrates, such as meat and fish.

Assessment

Check reproducibles to see that food chains are listed correctly.

Don't Break the Chain

A Lesson on How a Change in One Food Chain Link Affects All Others

Content

Students will write an op-ed, or opinion piece in which they support increased protection for coral reefs and explain the consequences of upsetting the reefs' food chains.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Science

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Naturalist



Verbal-Linguistic



Visual-Spatial

Prerequisites

Read *Coral Reef Food Chains* with students, paying special attention to the section entitled "Coral reefs in danger" on pages 28–29. Review the terms *food chains* and *food webs* before proceeding with the lesson.

Materials

- whiteboard and markers
- *Coral Reef Food Chains* books
- student copies of the *Don't Break the Chain* reproducible
- scissors
- tape
- crayons or colored pencils

Instructional Procedure

Anticipatory Set

Tell students that *coral reefs* are home to tens of thousands of different species of plants and animals. These organisms form complex food webs. Show students the photographs of coral reefs on pages 4, 5, 7, 26, and 30.

Class Discussion

Have students turn to pages 28–29 in the book. Ask: *What could damage or destroy a coral reef?* Write student responses on the board. Responses may include boating, coral harvesting, divers breaking off reef pieces for souvenirs, over-fishing of certain species, and pollution. Ask students to think about what the world would be like without coral reefs.

Objectives

The student will be able to...

- identify organisms found in a coral reef habitat
- understand current dangers to coral reefs
- create a bumper sticker which calls for the protection of coral reefs

Activity

Distribute the *Don't Break the Chain* reproducible, scissors, colored pencils or crayons, and tape. Tell students that they will be creating a bumper sticker to alert people of the destruction of the coral reefs. Show students an example of an environmental bumper sticker if possible.

Help students come up with catchy slogans to write on their bumper stickers. Then ask them to cut out the stickers, decorate them with pictures of coral reef wildlife, and then use tape to put them on display in the classroom.

Accommodations and Extensions

Encourage students to help one another create and write the slogan. You might want to place students in mixed-ability groups as well.

As an extension, students can create a short jingle or rap based on their slogan.

Closure

Invite students to present their bumper stickers to the class. Remind students that the destruction of the coral reefs means the end to complex food chains.

Assessment

Evaluate bumper stickers for persuasiveness, creativity, and neatness.

Food Chain Adventure

A Lesson on How Habitats Affect Food Chains

Content

Students will prepare a page for a travel brochure for a trip to a specific habitat to discover how habitats affect food chains.

National Standards

The following standards will be addressed in the lesson:

Science





Students should develop the abilities necessary to do scientific inquiry.

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:

-  Interpersonal
-  Naturalist
-  Verbal-Linguistic
-  Visual-Spatial

Prerequisites

Read books in the *Food Chains* series with students. Review the terms *food chains*, *habitat*, and *adaptation* before proceeding with the lesson.

Materials

- *Food Chains* books
- student copies of the *Food Chain Adventure* reproducible
- colored pencils, crayons, or markers

Instructional Procedure

Anticipatory Set

Remind students that plants and animals adapt to survive in specific habitats. Adapting helps animals grow and find food and protection. Ask: *What are some examples of how plants or animals have adapted to their habitats?* Students might mention that plants on a rainforest floor can grow with little direct sunlight because the trees overhead block the sun. Or they might say that arctic wolves and polar bears are white, which makes it harder for their prey to see them against the snow. If students have trouble remembering examples, point out examples in the *Food Chains* books.

Class Discussion

Ask: *How does a habitat affect its food chains?* Mention that seasonal changes in places such as meadows, prairies, and tundra affect the types of plants and animals that are available to eat at particular times of the year. For example, many herbivores live in the tundra only in the summer, when plants have enough sunlight to grow. Ask: *How do food chains and food webs protect their habitats?* Have students think about the balance created by predator-prey relationships. If one link in a food chain breaks, it can have serious consequences for the habitat. For example, tundra predators control the population of herbivores. If there were too many herbivores, they would eat all the tundra plants.

Objectives

The student will be able to...

- list the elements of a food chain
- identify the elements of a specific habitat
- explain how food chains help create a natural balance within a habitat

Activity

Explain to students that the class will work together to make a travel brochure for a trip to the tundra. Travelers will get the chance to view a food chain in its natural setting. The brochure will tell tourists which plants and animals they'll see on the trip, and it will explain how each one fits into a food chain in the tundra.

On the board, work with students to draw a food chain for the tundra. Refer to the book *Tundra Food Chains* as needed. Assign each pair of students one of the plants or animals in the food chain. Each pair should work together to complete the *Food Chain Adventure* reproducible. When students finish, combine the pages to create a travel brochure. Make sure the order of pages follows the order of the food chain.

Accommodations and Extensions

Review the lesson again for students who did not grasp the main concepts.

Challenge students to create a title and cover for the travel brochure.

Closure

Display the brochure pages on a wall in the classroom. Make sure students understand the relationship between habitat and food chains.

Assessment

Evaluate reproducibles and brochure pages for accuracy of information.

Hungry, Hungry Herbivores

A Lesson on the Importance of Herbivores in Food Chains

Content

Students will learn about the habits of herbivores and their place in food chains and food webs.

National Standards

The following standards will be addressed in the lesson:

Science

Students should develop the abilities necessary to do scientific inquiry.

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Interpersonal



Naturalist



Verbal-Linguistic



Visual-Spatial

Prerequisites

Read books in the *Food Chains* series with students, paying special attention to the sections on herbivores. Students should also have a good understanding of the elements that make up food chains and food webs.

Materials

- *Food Chains* books
- whiteboard and markers
- student copies of the *Hungry, Hungry Herbivore* reproducible
- pencils, crayons, and markers

Instructional Procedure

Anticipatory Set

Write the word *herbivore* on the board. Ask: *What is an herbivore?* Students may think of herbivores as animals that eat only plants. Explain that this category also includes animals that eat algae and some types of bacteria. Circle the first part of the word, *herb*, and point out that herbs are types of plants. This is a good way to help students remember that herbivores are plant-eaters. Explain that being an herbivore is not quite the same as being a vegetarian. Humans can choose to be vegetarians, whereas animals are adapted to eating only certain sources of food.

Class Discussion

Hold a class discussion about different herbivores. Ask: *What are some examples of herbivores?* Tell students that herbivores can range in size from tiny zooplankton to huge hippopotamuses and rhinoceroses. Ask: *What do herbivores eat?* Explain that not all herbivores eat the same thing or even the same part of a particular type of plant. Some animals, called *browsers*, eat only leaves and twigs that are high off the ground; others, known as *grazers*, eat only grasses and plants that grow near the ground. That's why a single section of land can support many different types of herbivores. Ask: *Why are herbivores an important part of the food chain?* Explain that if an herbivore is removed from its habitat, the plants it usually eats would grow out of control.

Objectives

The student will be able to...

- define *herbivore* and *predator*
- explain the importance of herbivores in food chains and food webs
- describe a specific herbivore, its diet, and its predators

Activity

Have students work with a partner and choose an herbivore they would like to study. Using the *Hungry, Hungry Herbivores* reproducible and their *Food Chains* books, students should draw a picture of an herbivore in the center box. Above the box they should draw pictures of the predators that eat the herbivore. Below the box they should draw pictures of the type of plant(s) the animal eats. They should also write one interesting fact about the herbivore's place in a food chain or food web.

Accommodations and Extensions

Put students in mixed-ability pairs.

As an extension, have students compare their herbivores and decide which organisms could live together peacefully in one location if adequate food supplies were available.

Closure

Have students present their findings to the class, with each student in the pair taking turns.

Assessment

Use or adapt the following rubric to assess students' work:

The students' reproducible included all necessary information.	0	1	2	3
The students' reproducible and presentation were factually accurate.	0	1	2	3
The students' presentation was organized and well-delivered.	0	1	2	3

Total

____/9

Catch Me If You Can!

A Lesson on the Importance of Predator-Prey Relationships

Content

Students will examine the predator-prey relationship and learn about the delicate balance between predator and prey.

National Standards

The following standards will be addressed in the lesson:

Science

Students should develop the abilities necessary to do scientific inquiry.

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Social Studies

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Naturalist



Verbal-Linguistic



Visual-Spatial

Prerequisites

Read books in the *Food Chains* series with students, paying special attention to the sections on how predators hunt and capture their prey as well as the sections on how animals detect and escape danger to avoid being captured. Review the terms *food chains* and *food webs* and the differences between them before proceeding with the lesson.

Materials

- *Food Chains* books
- student copies of the *Catch Me If You Can!* reproducible
- pens or pencils

Instructional Procedure

Anticipatory Set

Ask: *Why is the predator-prey relationship so important in nature?* The discussion should focus on the fact that it provides populations of some animals—*carnivores*—with food, while preventing populations of other animals—*herbivores* and lower-level carnivores—from growing out of control. When a predator-prey relationship changes, the effects are felt throughout the ecosystem.

Class Discussion

Ask: *What do you think happens if the size of the prey population increases?* Explain that if the number of prey increases, the number of predators increases as well because the predators have access to more food. More food means more predators will reproduce, and their numbers will increase. An increased number of predators means an increased need for food. As a result, the number of prey decreases. When this happens, there isn't enough food for all the predators, and their numbers drop. The cycle begins again. In this way, the two groups maintain a delicate balance.

Objectives

The student will be able to...

- define *predator* and *prey*
- explain the predator-prey relationship
- explain how the predator-prey relationship maintains balance in an ecosystem

Activity

Work with students to act out the balance in the predator-prey relationship. Divide the class into two groups; one group is the predators, and the other is the prey. Have predators line up along one wall and prey along another.

Have half of the prey stand in the middle of the room. Tell one predator to stand beside each prey. Then ask the rest of the prey to join the group in the middle of the room. Ask: *What happens to the number of predators, now that there is more prey?* Students should see that the number of predators can increase too, since there is now more available food. Have the rest of the predators join the new prey in the center.

Ask: *What happens to the prey now that there are so many predators?* Students should say that the number of prey decreases, because they will be eaten. Ask most of the prey to return to the side of the room. Then, point out that there are a lot of predators and very little prey. Ask: *What happens to the number of predators when there is little prey?* Students should explain that the number of predators drops because there is less food available. Send most of the predators back to the side of the room. You should now be left with an even number of predators and prey in the center. Point out that the two groups have maintained their balance, and the cycle can begin again.

Accommodations and Extensions

Make the activity more concrete by having each student hold a sign that says “predator” or “prey.”

As an extension, have students explain the predator-prey relationship they just acted out by filling out the *Catch Me If You Can* reproducible.

Closure

Have student volunteers explain the steps in the predator-prey cycle. Write the steps in a list on the board. Remind students that while predation may seem cruel, it’s an important part of maintaining balance in nature.

Assessment

Make sure students can define *predator* and *prey* and explain the relationship between the two.

Building the Energy Pyramid

A Lesson on How Energy Flows Through Food Chains

Content

Students will act out the transfer of energy from one organism to another in a food chain. They will also match organisms to their corresponding levels on the energy pyramid.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students should apply strategies to comprehend and interpret texts.

Students use the writing process to communicate for a specific purpose.

Science

Students should develop an understanding of transfer of energy.

Students should develop an understanding of organisms and environments.

Science

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Logical-Mathematical



Naturalist



Visual-Spatial

Prerequisites

Read books in the *Food Chains* series with students, paying special attention to the sections on energy pyramids. Review with students the other links in food webs: producers, herbivores, carnivores, and omnivores.

Materials

- *Food Chains* books
- image of an energy pyramid from any of the *Food Chains* books
- sheets of 8½ x 11 paper
- student copies of the *Building the Energy Pyramid* reproducible

Instructional Procedure

Anticipatory Set

Ask: *Have you ever wondered why there are so many more plants than animals?* Explain that plants are the source of energy for almost all life on Earth. There must be enough plant material to support all the other organisms. As energy “producers,” plants are at the beginning of all food chains, and they make up the bottom level of energy pyramids. Tell students that an *energy pyramid* shows how energy moves through the organisms in a food chain.

Class Discussion

Discuss the different links in a food chain: producer, primary consumer, secondary consumer, and tertiary consumer. Ask: *How does each link in the food chain get its energy?* Ask students to predict what will happen if there are too many animals and not enough plants in a habitat.

Show students an *energy pyramid*. Explain that energy passes from the plant to the herbivore that eats it; then energy passes to the carnivore that eats the herbivore. But the amount of energy decreases each time it moves to a new consumer. Tell students they will trace the energy flow in a food chain by completing a group activity.

Objectives

The student will be able to...

- define *energy pyramid*
- identify the sources of energy in an energy pyramid
- explain why the amount of available energy decreases as it moves further from the producer

Activity

Divide the class into groups of three, and give each student a role: producer, herbivore, or carnivore.

1. Give each producer a sheet of $8\frac{1}{2}$ x 11 paper and ask them to fold it ten times along the short edge, like an accordion. The folded paper represents all the energy that the plant makes through photosynthesis.
2. The plant needs to use most of its energy. Tell producers to tear off three strips of paper for energy used in the process of making more energy. Tear off another three strips to represent energy necessary for growth. Tear off two more strips for heat lost to the atmosphere. Tear off one final strip: this stands for parts of the plant that can't be eaten. There is one strip of energy left. That's what the herbivore gets when it eats the plant. The producers should give these strips to the herbivores.
3. Ask the herbivores to fold the strip ten times, creating a band of "energy blocks." Tear off four blocks to represent energy used while moving around to look for food and to try to keep from becoming food. Tear off another three blocks to illustrate energy used for normal body functions. Tear off one block for heat lost to the atmosphere and another block to represent the parts of the animal that aren't edible. There is one energy block left. That's what the carnivore gets when it eats the herbivore. These blocks should be given to the carnivores.

(Optional: If there are extra students, make them decomposers. They can collect the strips representing the inedible parts of the plants and the blocks representing the inedible parts of the animals.)

Explain that only about 10%, or $\frac{1}{10}$, of available energy moves up to the next level of the energy pyramid. This means secondary consumers only get about 1%, or $\frac{1}{100}$, of the plant's available energy. A tertiary consumer would only get .1%, or $\frac{1}{1000}$! Energy pyramids don't have many levels because there would not be enough available energy to support the organisms at the top. Distribute the *Building the Energy Pyramid* reproducible. With students, complete the energy pyramid for a habitat near your school or community.

Accommodations and Extensions

Allow English-language learners to use dictionaries or other resources to answer the questions on the reproducible, or have them answer the questions orally.

As an extension, have students research the food requirements in a simple food chain (producer, herbivore, carnivore) and diagram it as an energy pyramid.

Closure

Stress the importance of the sun and plants in the cycle of life. Suggest that the next time students look at plants they should consider how many different organisms those plants are supporting.

Assessment

Observe student participation in the activity and review reproducibles for accuracy and neatness.

Let's Hear It for Worms!

A Lesson on the Importance of Decomposers in Food Chains and Food Webs

Content

Students will gain a better understanding of decomposers by designing posters that teach people to appreciate these unpopular organisms.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Science

Students should develop an understanding of organisms and environments.

Students should develop an understanding of changes in environments.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Naturalist



Verbal-Linguistic



Visual-Spatial

Prerequisites

Read books in the *Food Chains* series with students, especially *Meadow Food Chains* and *Prairie Food Chains*. Pay special attention to the sections on decomposers. Review the movement of energy through a food web.

Materials

- *Food Chains* books
- student copies of the *Let's Hear It for Worms!* reproducible
- poster board, one per group
- markers and crayons

Instructional Procedure

Anticipatory Set

Ask: *How do you think most people feel about bacteria, fungi, and insects?* Students might respond that many people think these organisms are dirty, disgusting, and carry diseases. Explain to students that these *decomposers* serve a vital role in the food chain. For some examples, point students to pages 24–25 in *Prairie Food Chains* or *Meadow Food Chains*. Tell students that their task will be to try and change such negative impressions of decomposers by making a persuasive poster.

Classroom Discussion

Explain how decomposers play an important role in food chains and webs. You may want to explain that they eat *detritus*, decomposing plants and animals. Without them, dead animals and plants would start piling up (thus increasing dirt and disease), and much of the energy that remains in the dead animals and plants would be lost.

Objectives

The student will be able to...

- define *decomposer* and *detritus*
- explain the importance of decomposers to the natural energy cycle in a food chain
- analyze the importance of specific decomposers within their food chains

Activity

Divide students into groups. Explain that each group will design a poster promoting decomposers as “good guys.” First, work with students to brainstorm a list of decomposers. Encourage students to refer to the *Food Chains* books if necessary. Then, have each group choose one decomposer to focus on in their poster. Distribute copies of the *Let’s Hear It for Worms!* reproducible. Have students complete the reproducible to help them gather and organize their information before making their posters.

Point out that the reproducible asks them to create a slogan for their decomposer. Explain that a slogan is a short, catchy statement that conveys a message. So, students’ slogans should mention their decomposer and say something nice about it. For example, if your decomposer is a worm, your slogan might be “Let’s Hear It for Worms!”

Accommodations and Extensions

Place students in mixed-ability groups.

Help groups brainstorm slogans if they have trouble creating them on their own.

As an extension, students can put together a one-paragraph radio script persuading people to think more positively about decomposers.

Closure

Each group should present its poster to the class and hang it in the hallway.

Assessment

Evaluate student posters for accuracy, completeness of information, and clarity of message.

Name _____ Date _____

From Chains to Webs

Directions: Write the names of the animals in each food chain.

Food Chain #1

Food Chain #2

Producer



Consumer



Consumer

Producer



Consumer



Consumer

Name _____

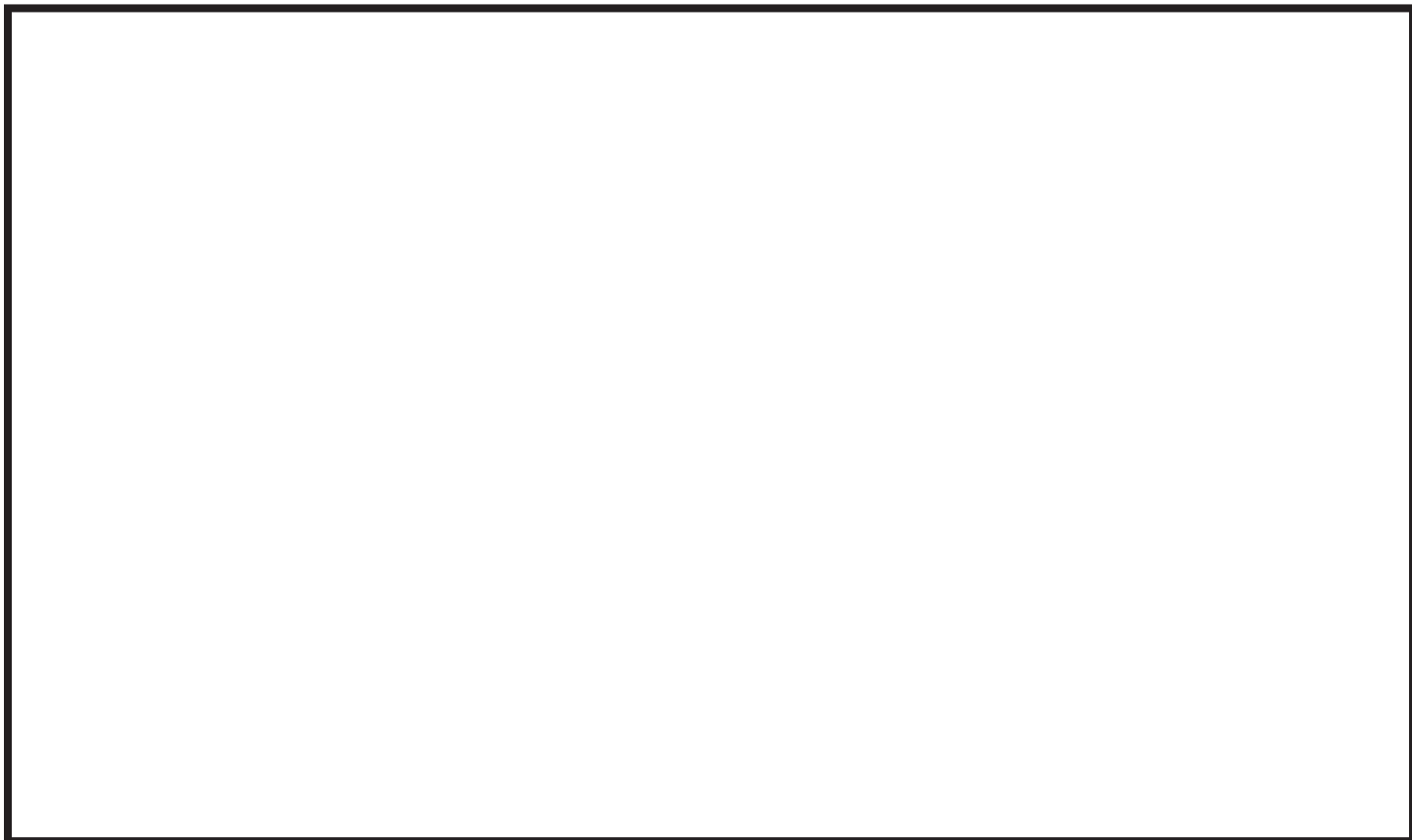
Date _____

Don't Break the Chain

Directions: Cut along the dotted line. Write your slogan on the bumper sticker. Don't forget to decorate it!

Food Chain Adventure

Directions: Create your travel brochure page by drawing a picture of your plant or animal in the box and then filling in the blanks below.



1. Name of plant or animal: _____

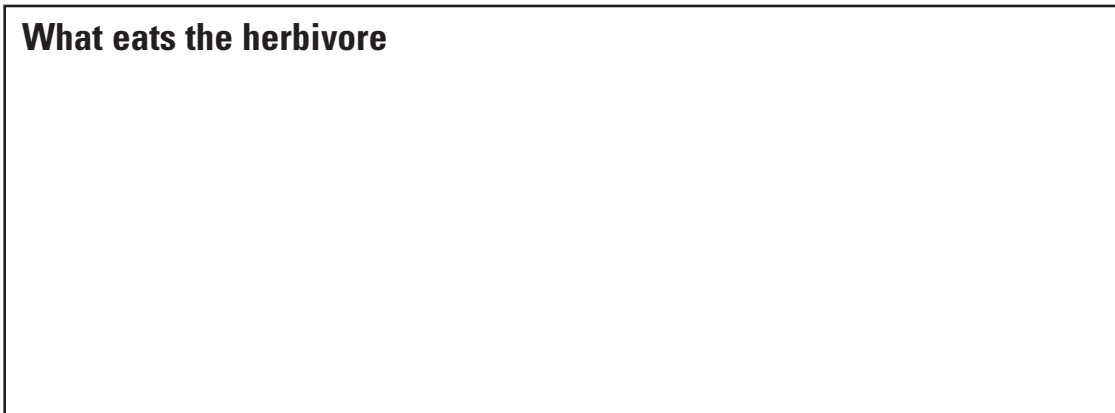
2. How has the plant or animal adapted to its habitat?

3. How does the plant or animal fit into the tundra food chain?

Hungry, Hungry Herbivores

Directions: Draw a picture of the herbivore in the center box. Above the box, draw a picture of the herbivore's predators. Below the box, draw pictures of what the herbivore eats. Add an interesting fact about the herbivore at the bottom of the page.

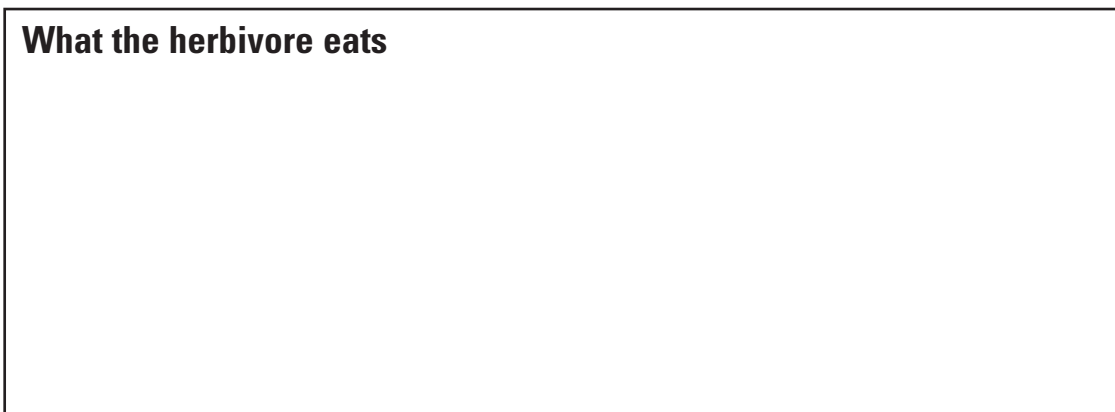
What eats the herbivore



Herbivore



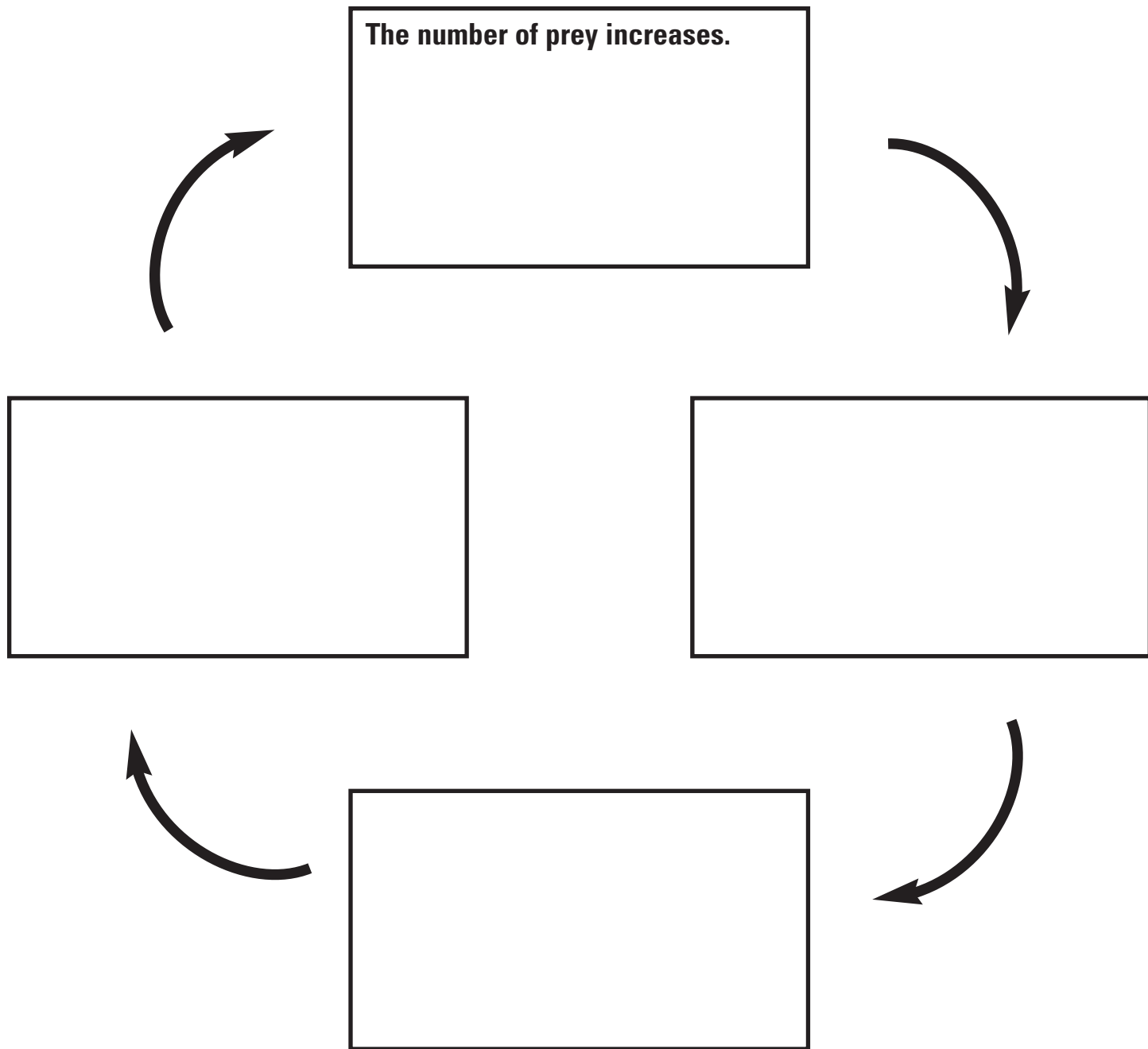
What the herbivore eats



Interesting fact: _____

Catch Me If You Can!

Directions: Explain the steps in the predator-prey cycle by filling out the chart below. In each box, use words or pictures to explain what happens to the number of predators and/or prey.

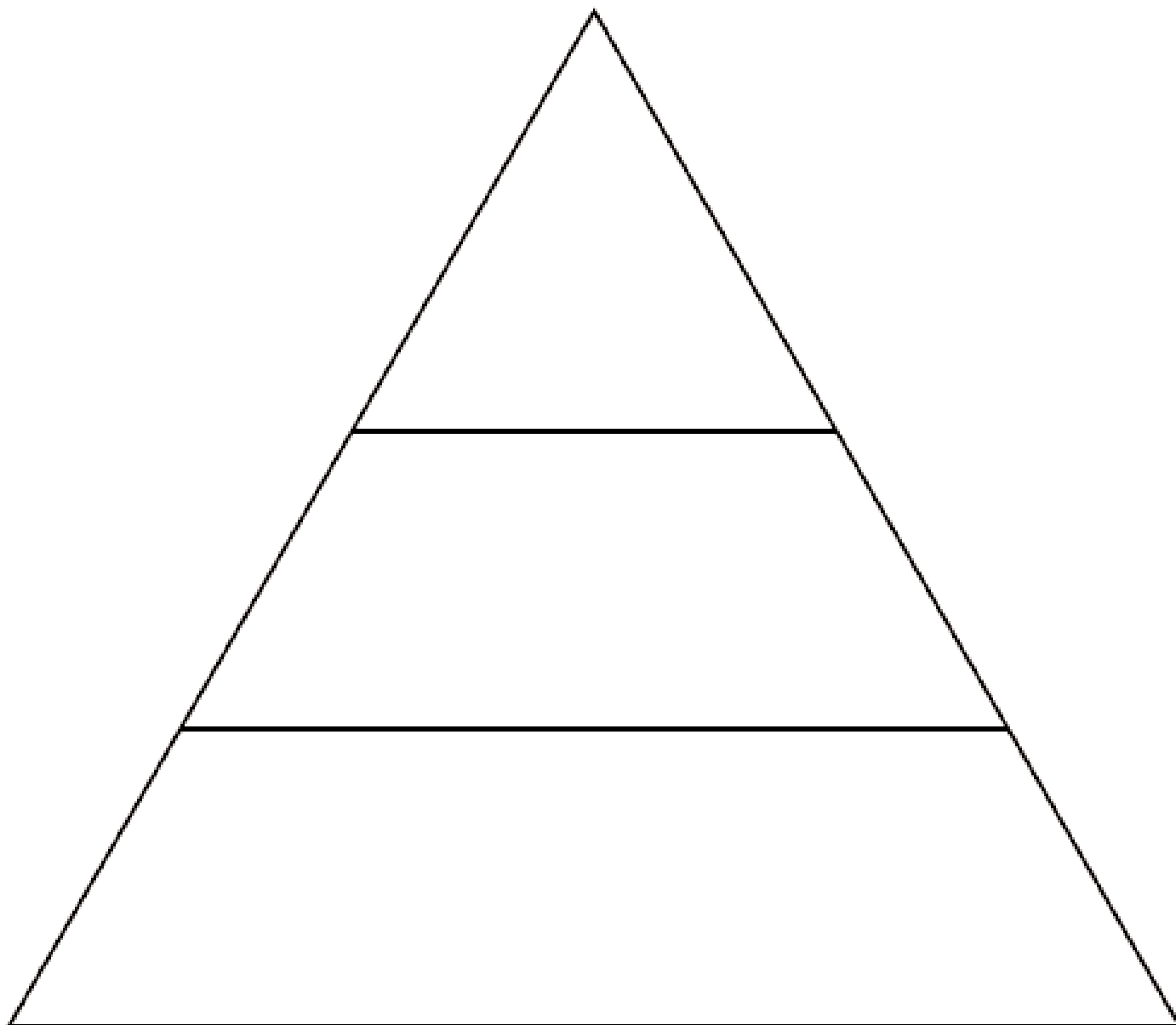


Name _____ Date _____

Building the Energy Pyramid

Directions: Using one of the *Food Chains* books, fill in the energy pyramid below for a habitat near you. Include both pictures and words in your diagram.

Habitat: _____



Name _____ Date _____

Let's Hear It for Worms!

Directions: Answer the following questions. Then, create your poster by arranging your information as shown below.

Name of decomposer: _____

Where it's found: _____

Why it's important: _____

Slogan (example: "Let's Hear It for Worms!"): _____

SLOGAN

PICTURE

Name:

Where it's found:

Why it's important: