



Georgia Department of Education

Students will find out about the roles of organisms and flow of energy in ecosystems by modeling food chains and food webs. They will work with scenarios depicting changes in the ecosystem that impacts the organisms living there.

Student Science Performance

Grade or course Fourth Grade

Title:

Topic: Role of Organisms

Bake the Cake and Eat It Too.

Performance Expectation for GSE:

S4L1. Obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem.

- a. Develop a model to describe the roles of producers, consumers, and decomposers in a community. *(Clarification statement: Students are not expected to identify the different types of consumers – herbivores, carnivores, omnivores and scavengers.)*
- b. Develop simple models to illustrate the flow of energy through a food web/food chain beginning with sunlight and including producers, consumers, and decomposers.
- c. Design a scenario to demonstrate the effect of a change on an ecosystem. *(Clarification statement: Include living and non-living factors in the scenario.)*
- d. Use printed and digital data to develop a model illustrating and describing changes to the flow of energy in an ecosystem when plants or animals become scarce, extinct or overabundant.

Performance Expectations for Instruction:

Students will

- Use basic foods such as those served for lunch to make simple food chains.
- Understand that the energy from the food is used by the consumer of the food.
- Distinguish between producers, consumers, and decomposers.
- Realize that plants get their energy using sunlight to produce food.
- Imagine or research scenarios of examples of what happens to an ecosystem and the organisms that live there if there are too many organisms (kudzu), not enough organisms (construction or disease affecting a farm) or an absence of organisms (plants and animals that are endangered or extinct) to give consumers the energy they need.
- Research keystone species in Georgia such as the Gopher Tortoise.
- Find instances of changes of living and nonliving factors such as construction, new roads, and/or natural disasters such as flooding, weather events, earthquakes etc. that have changed an ecosystem.

[Additional notes on student supports](#)

Materials

Students will continuously obtain, evaluate, and communicate information. This is not a linear process. Students will communicate through writing and discussions to allow for formative assessment. This benefits the teacher, student, and whole group to guide instruction to clarify misconceptions or extend content.

Engaging Learners

Phenomenon

[Eating on the Space Station](#)

Bob Thirsk and Frank De Winne talk about food and eating on the space station.

[Dessert in Space](#)

	<p><i>Obtaining</i></p> <p>Have students discuss these questions: Does a rabbit eat dessert? Why do we eat dessert and other animals do not? What does a rabbit eat? Where does this food come from? What eats a rabbit?</p> <p><i>Teacher Notes: Provide a space for students to ask their own questions such as posted chart paper with sticky notes or a box with slips of paper. Have them use spare time to look for answers to their questions about how organisms get the energy they need from food.</i></p> <p>Then explain: Those are the types of relationships we will work with in this segment.</p>
	<p><i>Communicating</i></p> <p>What role does sunlight and plants have to do with making the cake the astronaut ate in the video?</p> <p>What are the ingredients in a chocolate cake? (<i>Flour, eggs, cocoa, milk, butter, and vanilla</i>)</p> <p>These are products we purchase in a store, but where do they come from? Have students take each product and determine its origin. (<i>Flour comes from wheat that grows because sunlight helps it make food. Eggs come from chickens that eat grain that grows because it makes food using sunlight. Cocoa is a bean that comes from a plant that grows because sunlight helps it make food. Milk and butter come from cows that eat grass that grows because sunlight helps it make food. Vanilla comes from a bean that grows on a plant that uses sunlight to make its food.</i>)</p> <p>Ask: Do you see a pattern in our food products? Plants produce their food using sunlight. That is why we call them producers. When something eats a producer or consumes the product, we call it a consumer. Uneaten producers and consumers decompose when they die or are not consumed. Decomposers like mushrooms and bacteria get nutrients from them.</p> <p><u>Food Chain Model</u></p> <p>Students will develop models of a food chain of the astronaut eating chocolate pudding cake. Remind them that the arrow points to the consumer of the product showing where the energy goes.</p> <p>For example: Astronaut ← cake ← flour ← wheat ← sunlight</p> <p>Now have students choose an item from the lunch menu and make a food chain of that item. Remind them that they are the top of the food chain, the consumer of the food.</p>
<p>Exploring</p>	<p><i>Obtaining</i></p> <p>Challenge students to make another connection to the terms. Say: “You got a gift card for your birthday. You can eat anything off of the menu at your favorite restaurant. Write the foods you would have and whether they are producers, consumers, or decomposers.”</p> <p><i>Teacher Notes: Remind students that the fungi, mushrooms, are decomposers.</i></p>

	<p><i>Communicating</i> Students will make models of food chains and food webs to understand the flow of energy.</p>
	<p><i>Evaluating</i> Have students check each other’s models for correct arrow placement and that the chain begins with sunlight and continues from producer to consumer.</p> <p>Food Webs are interconnected food chains. More than one consumer eats different producers or consumers. Explain that a food web consists of organisms that have common foods they consume, such as, lots of animals eat grass. Arrows would point to where the energy from eating grass goes to cows, deer, horses, and other grazing animals. Snakes get their energy from lots of small animals. They can top a food web until they are eaten by another predator such as an owl or hawk.</p> <p>Examples of food webs can be found online, as well as simple games and interactives.</p>
<p><i>Explaining</i> Finalizing Model</p>	<p><i>Obtaining</i> Local (Georgia) animals and the issues: Endangered Species of Georgia article</p> <p>Have students research current event for natural occurrences in nature that would have an effect on an ecosystem, such as the construction of shopping center, making a road through farmland, an extreme weather event such as an early frost, tornado, hurricane, flood, or drought.</p> <p><i>Communicating</i> Have them draw a storyboard and write a story about how this event or occurrence affected what they chose to eat for their birthday celebration.</p> <p>How will my menu (food web) change if a product is too expensive or no longer available?</p> <p>Students will display the food web scenario on large paper for display and conversation.</p> <p><i>Evaluating</i> Have students critique the storyboards to see if they contain the correct conclusions.</p>
<p><i>Elaborating</i> Applying Model to Solve a Problems</p>	<p>Phenomenon Space Station Safari's Ultimate Wildlife Research</p> <p>Ask: What is the International Space Station doing to help endangered species?</p> <p>Why is it important that we protect these plants and animals? What do they eat or what eats them that keeps the ecosystems in Georgia healthy?</p> <p>Designated Georgia's State Reptile in 1989, the gopher tortoise is now officially recognized for its contributions to the ecological balance of the state's coastal plain habitat. Now listed as “threatened,” it is considered a keystone species in the rapidly disappearing longleaf pine/wiregrass ecosystem.</p>

	<p>A keystone species is an organism that makes such an impact on an ecosystem, that it is key to the survival of other organisms and can change the nonliving factors of the environment.</p> <p><i>Teacher Notes: Have students research the role of wolves in Yellowstone National Park or others by researching “keystone species.”</i></p> <p>Why is the gopher tortoise so important? More than 300 species depend on gopher tortoise burrows. Why is it threatened?</p> <p>What could happen that would threaten the gopher tortoise in Georgia? Research this animal and other keystone species animals to determine what is happening to cause problems in their survival.</p> <p><i>Communicating</i> Challenge students to make a presentation of how the flow of energy in the ecosystem is changing because of the threatened, endangered or extinct plant or animal to share with others. Include information about weather, land use, and other factors that are threatening the survival of these plants and animals. Have them design a possible solution to the problem such as protection, relocation, communicating problem to others, etc.</p> <p><i>Evaluating</i> Overabundance is also a threat to wildlife and plants. Have students look for instances of uncontrolled growth of a kudzu vine or other invasive species. Ask the students to explain what happens when a plant or animal population takes all of the resources from other plants or animals.</p> <p>Have them play simulation games about overpopulation such as Oh Deer, From the Georgia Department of Natural Resources</p> <p>The International Space Station is working to figure out how to grow plants in space. Show students only the first 1:14 of this video and lead a discussion about how this is important as the foundation of the food chain. Growing Plants in Space</p> <p>Have them use what they know to write a science fiction story based on foods in space.</p>
Evaluation	<p style="text-align: center;">Assessment of Student Learning</p> <p>Student food chain and food web models should show correct arrow placement and order. Food web scenario provides a storyboard with necessary components. Presentation of scenario should have the correct information about the problem and logical solution.</p>
<i>SEP, CCC, DCI</i>	Science Essentials
Science and Engineering Practices	<ul style="list-style-type: none"> ● Developing and using models ● Constructing explanations and designing solutions ● Obtaining, evaluating, and communicating information
Crosscutting Concepts	<ul style="list-style-type: none"> ● Energy and Matter ● Structure and Function

Disciplinary Core Ideas	<p>From <i>A Framework for K-12 Science Education</i>:</p> <ul style="list-style-type: none">● LS1.C: ORGANIZATION FOR MATTER AND ENERGY FLOW IN ORGANISMS● LS2.A: INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS● LS2.B: CYCLES OF MATTER AND ENERGY TRANSFER IN ECOSYSTEMS● LS2.C: ECOSYSTEM DYNAMICS, FUNCTIONING, AND RESILIENCE● LS4.B: NATURAL SELECTION● LS4.C: ADAPTATION● LS4.D: BIODIVERSITY AND HUMANS
-------------------------	---

Additional Supports for struggling learners:

The following supports are suggestions for this lesson and are not the only options to support students in the classroom. These supports target students that struggle with science material, this lesson or a previous lesson. These are generalized supports and do not take the place of IEP accommodations as required by each student’s Individualized Education Program.

General supports for the following categories:

<u>Reading:</u>	<u>Writing:</u>	<u>Math:</u>
<ol style="list-style-type: none"> 1. The teacher can have students match letters prior to reading to remind them of the alphabet. 2. The teacher can have students identify words that they know in the text as the class reads. 3. The teacher should remind students to use strategies when they are reading. 	<ol style="list-style-type: none"> 1. The teacher can provide practice for students in the area of writing both in context and practicing just letters. 2. The teacher can provide a sentence starter for the students. 3. The teacher should continually give encouragement to the students. 4. The teacher can provide constructive positive feedback during the writing process to help students understand the expectations. 	<ol style="list-style-type: none"> 1. Provide students with opportunities to interact with numbers. 2. The teacher can provide manipulatives to allow the students to count and interact with materials.

Supports for this specific lesson if needed:

Performance expectations for instruction:

1. The teacher should provide information to students in various formats to reach as many students as possible.
2. The students should be given adequate time to complete each part of the lesson.
3. The students should be allowed to express their knowledge in various formats.
4. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material.

Engage:

1. The teacher should consider showing the video more than once as needed for students to make observations.
2. The teacher should have clear and consistent guidelines for student discussions. These guidelines should help students feel more comfortable and be more likely to participate in the discussion.

3. The teacher should try to explain the relationships that the class will be looking into in this segment in different ways that all the students to preview the material as needed.
4. The teacher should consider giving images of the ingredients that might be used in the chocolate cake to allow them to visualize the materials needed. This should help the students answer the questions about the materials.
5. The teacher may need to remind students what patterns are and have the students practice identifying the patterns prior to discussing patterns in foods.
6. The teacher may need to use guiding questions to assist the students in developing a model of a food chain.
7. The teacher can consider having students work in pairs or groups to make the model of a food chain.
8. The teacher can, also, consider providing students with several organisms and have the students put those organisms into a food chain.

Exploring:

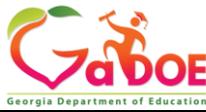
1. The teacher should consider giving students a list of foods to choose what they would like their meal to be. Then the students can try to determine ingredients and where the ingredients fall within the food chain.
2. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. These formats could include writing, drawing, labeling images or designing a presentation.
3. Students may need additional time to complete their assignment.
4. The teacher should have clear and consistent guidelines for students providing feedback to one another. These guidelines should assist students in providing clear, respectful and useful feedback that students can use to improve their work.
5. The teacher can consider having students attempt to put their food chains together to make a food web.

Explaining:

1. The teacher should consider assisting students in accessing the material in the article by facilitating a read aloud, utilizing text-to-speech or showing a video.
2. The teacher should consider providing students with sources to find current events that will impact the ecosystem.
3. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. These formats could include writing, drawing, labeling images or designing a presentation.
4. Students may need additional time to complete their assignment.
5. The teacher should consider having multiple options for sharing student work. These formats could include using technology, gallery walk or giving a presentation.

Elaborating:

1. The teacher should consider assisting student's ability to access the information in the article by facilitating a read aloud, utilizing text-to-speech or showing a video.
2. The teacher should consider providing students with resources to find information about keystone species in Georgia.



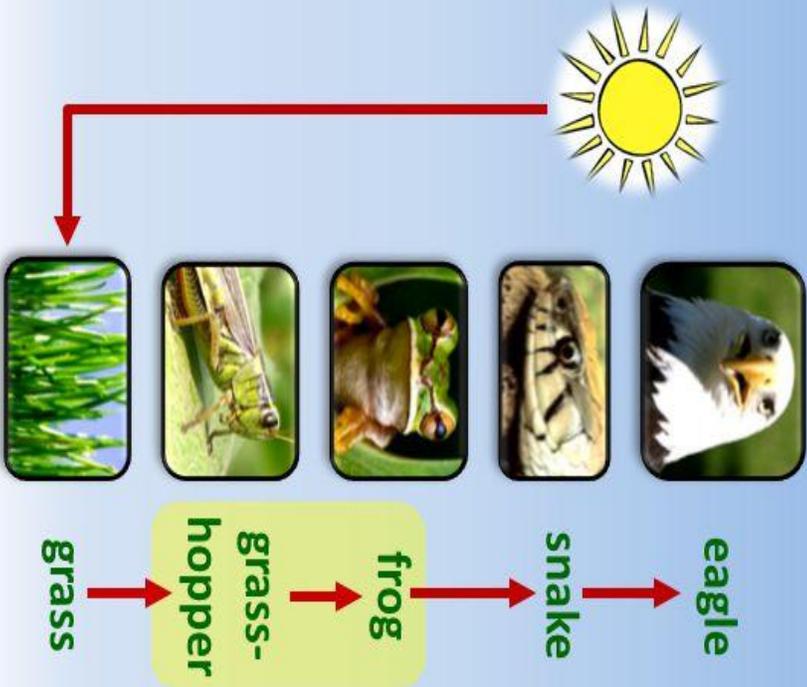
3. The teacher should consider providing students with an organizer to record their research.
4. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. These formats could include writing, drawing, labeling images or designing a presentation.
5. Students may need additional time to complete their assignment.
6. The teacher should have clear and consistent rules for any games that are played in the classroom. These rules should be used to make students feel more comfortable and able to participate.

Evaluating:

1. Students may need additional time to complete their assignment.
2. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. This could include labeling images, drawing pictures, writing or verbally explaining.

FOOD CHAINS

Food Chain: is a sequence of feeding relationships describing which **organism eats another**.



The **Sun** is the **source of energy** for food chains.

Keep in mind that the arrow **tip** always points towards the **"eater"**.

