



# **Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project**

## **Grade 5 Science**

### **Unit 2 Instructionally-embedded Assessment Task Specification Tool:**

#### **“The Life of a Bear”**

#### **Matter and Energy in Organisms and Ecosystems**

**January 2023**

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<b>Grade 5</b>	<b>Unit 2</b>	<b>Instructional Segment 1</b>	<b>Task Title: The Life of a Bear</b>
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## Unit 2: Matter and Energy in Organisms and Ecosystems

<b>Anchor Phenomenon</b>	<b>Problematization/Investigative Strategy for the Unit</b>
In this unit, the anchor phenomenon is based on the shared experience the class will have dissecting owl pellets. The teacher can problematize this for students by setting up the general questions: “What do owls eat? Is it possible to tell what an owl eats by dissecting owl pellets?”	If we want to understand whether the owl population has enough to eat, we’ll need to investigate what they eat and why they need to eat. We’ll need to understand how the owls’ food supply is also dependent on the food supply and the interconnected plants and animals that live in the ecosystem. Was a new species introduced to the ecosystem that changed the balance and decreased the owls’ food supply?

## Segment 1 Overview

This unit consists of three segments, each engaging students in multiple science and engineering practices and crosscutting concepts as students make sense of the key disciplinary ideas of energy in chemical processes and everyday life, matter and energy flow in organisms, interdependent relationships in ecosystems, and cycles of matter and energy transfer in ecosystems.

Assessments for this segment focus on students' ability to obtain and communicate information and use models and data to identify and explain what animals eat, how they use this food, and that the foundation of food webs are plants. Students are informally assessed on their ability to obtain and communicate information, some of which includes analyzing data and using models to show how energy for motion and/or body warmth in animals comes from food, and how tracing most animals’ food source(s) eventually leads back to plants. Students are formally assessed at the end of the segment on their ability to identify and use evidence from various sources (texts, prior investigations, models) to construct an explanation about these same disciplinary core ideas.

<b>Lesson Title(s)</b>	<b>Lesson Description</b>
Eating for Energy and Matter	<p>Students watch videos of animals doing activities that require energy and/or matter (e.g., swimming, playing, eating, growing over their lifetime, “warm-blooded” animals living in cold climates, etc.). Students discuss where animals acquired the energy and matter to do these things. Students draw from the examples and discussion to conclude that food provides energy (in addition to the matter).</p> <p>Students revise their explanatory model by adding an arrow/line from the prey to the owl indicating the flow of energy. This energy arrow/line will use a different style/color than the arrow/line representing matter which was added to the model in the Matter Matters lesson.</p> <p><u>What Students Figure Out</u></p>

- a. The breakdown of food in the body provides the energy that animals need to maintain body warmth and to move. (CCC: Energy& Matter: Energy can be transferred in various ways and between objects.)

The Importance of Plants in Food Webs

Students return to their model of a food chain, but this time expand it into a food web (as a class, the teacher discusses and emphasizes differences and similarities between a chain and a web). Students can start by looking at other students’ food chains from the Food Chain lesson. The teacher can also provide several additional animals and plants that are part of the barn owl/local predator’s ecosystem. Students are given at least one carnivore, herbivore, and omnivore. Students can learn more about these categories and food sources through discussion, readings, and other media. Combining multiple pieces of information, students create their food webs and add evidence to their explanatory models. Using guiding questions, the teacher helps students identify the evidence they have gathered to argue that irrespective of which animals are in play, the foundation of the food web begins with the sun providing energy to plants. This provides an important and natural segue into instructional segment 2, where students explore the idea that plants need food to grow, which they make themselves by using energy from the sun and materials (chiefly air and water) from the environment.

By the end of the lesson, "The Importance of Plants in Food Webs", students will be able to use evidence they’ve gathered to argue that irrespective of which animals are in play, the foundation of the food web begins with plants.

What Students Figure Out

- a. Plants form the foundation of the food web: Tracing most animals’ food source(s) eventually leads back to plants. (CCC: System & System Models; CCC: Energy & Matter: Matter)

**Formal Assessment Title**

**Assessment Description**

Modeling Energy and Food Webs

Throughout Segment 1, students progressively add to an explanatory model of the owl/predator’s food web using the knowledge they gain from looking at what animals eat and do with that food. Students determine that all food sources ultimately lead back to plants. This can be demonstrated using a concept map of a food web, or even building a 3D/tactile representation of a food web for a hands-on task.

**NGSS PE(s) Code(s) & Description(s)**

**5-PS3-1** Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. **[Clarification Statement: Examples of models could include diagrams, and flow charts.]**

**5-LS2-1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. **[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]**

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**AG(s) Code(s) & Description(s)**

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**A4.** Obtain and communicate information about how the energy for motion and/or body warmth in animals comes from food.

**A5.** Use a model to describe how the energy for motion and/or body warmth in animals comes from food.

**A6.** Use a model to describe that plants form the foundation of the food web.

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**Evidence Statement(s)**

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- Identify information that relates to how energy for motion and/or body warmth in animals comes from food.
  - Describe how the energy for motion and/or body warmth in animals comes from food.
  - Describe how a model shows how energy for motion and/or body warmth in animals comes from food.
  - Use models to show how tracing most animals' food source(s) eventually leads back to plants.
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**Phenomenon or Phenomenon-rooted Design Problem**

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- Bears eat both plants and animals to survive. Bears survive by living in specific ecosystems which provide the matter and sources of energy (i.e., plants and animals) to engage in characteristics that support survival. Bears break down the food they eat to move, find food, and survive.
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**General Scenario Description**

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Bears live in a variety of places across North America. Depending on the time of year, the ecosystems that the grizzly bears live in must provide varying amounts of food.

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**Chain of Sensemaking**

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- Students watch a video and be directed to complete a graphic organizer to identify behaviors of grizzly bears.
  - Students use provided components of an ecosystem in which grizzly bears live to create a model of a food chain and the flow of energy.
  - Students explain the relationship between the consumer (grizzly bear) and the matter (e.g., plants, insects, elk) that is consumed and the use of this energy to support movement and survival.
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**Work Products**

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- Figure
  - Concept map
  - Selected response
  - Sentences starters / constructed response
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**Application of Universal Design for Learning-based Guidelines to Promote Accessibility (<https://udlguidelines.cast.org/> )**

Multiple Means of Engagement	Multiple Means of Representation	Multiple Means of Action & Expression
<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Context or content</li> <li><input checked="" type="checkbox"/> Age appropriate</li> <li><input checked="" type="checkbox"/> Appropriate for different groups</li> <li><input checked="" type="checkbox"/> Makes sense of complex ideas in creative ways</li> <li><input checked="" type="checkbox"/> Vary the degree of challenge or complexity within prompts</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Provide visual diagrams and charts</li> <li><input checked="" type="checkbox"/> Make explicit links between information provided in texts and any accompanying representation of that information in illustrations, equations, charts, or diagrams</li> <li><input checked="" type="checkbox"/> Activate relevant prior knowledge</li> <li><input type="checkbox"/> Bridge concepts with relevant and simple analogies and limited use of metaphors</li> <li><input type="checkbox"/> Highlight or emphasize key elements in text, graphics, diagrams, formulas</li> <li><input checked="" type="checkbox"/> Use outlines, graphic organizers, unit organizer routines, concept organizer routines, and concept mastery routines to emphasize key ideas and relationships</li> <li><input checked="" type="checkbox"/> Give explicit prompts for each step in a sequential process</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Solve problems using a variety of strategies</li> <li><input type="checkbox"/> Sentence starters</li> <li><input checked="" type="checkbox"/> Embed prompts to “show and explain your work”</li> </ul>

**Targeted PE(s) Code(s) and Alternate Conception(s)**

- **NGSS PE: 5-PS3-1** Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. **[Clarification Statement: Examples of models could include diagrams, and flow charts.]**
  - **Common Alternate Conceptions**
    - Energy is not necessary for life functions.
    - Life processes destroy energy.
    - Plants obtain energy for growth from the soil (with assistance from decomposers) or human activity rather than from sunlight.
    - Energy cannot be gained from eating dead animals because dead things do not have energy.
- **NGSS PE: 5-LS2-1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. **[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]**
  - **Common Alternate Conceptions**

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- Soil is the primary source of energy for plants.
  - Dead things do not have energy/nutrients and do not have value to an ecosystem.
  - Small changes to an ecosystem only have small impacts.
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### **Unit 2 Vocabulary**

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| • Ecosystem   | • Energy transfer | • Population |
| • Environment | • Stored energy   | • Producer   |
| • Energy      | • Matter          | • Consumer   |
|               | • Organisms       | • Food web   |
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