



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

## **Grade 5 Science**

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

#### **“Lights for Plants, On or Off?”**

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

**January 2023**

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<b>Grade 5</b>	<b>Unit 2</b>	<b>Instructional Segment 2</b>	<b>Task Title: Lights for Plants, On or Off?</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 2 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 carry out investigations, analyze and interpret data, and model to engage in argumentation about the role of air, water, and sunlight in plant growth. The importance of the sun in providing energy to plants that form the foundation of the food web is emphasized and modeled. Students are formally assessed about these concepts and informally assessed using data and observations to describe what makes plants grow.

<b>Lesson Title</b>	<b>Lesson Description</b>
Conditions for Plant Growth	<p>By engaging in the lesson, "Lights for Plants: On or Off?", students will be able to collect data on how the presence and absence of sunlight energy impact plant growth. Students are presented with plants that they watch over time in various stages of light (lights or sun). The data from the experiment will give students the opportunity to describe the pattern of the role that light plays in plant growth. Students engage in observation and gather data to address the pattern between light and plant growth and argue for the cause-and-effect relationship between light and plant growth.</p> <p>The teacher will add to the anchor chart/poster by drawing an arrow/line representing energy transferring from the sun to the plants.</p> <p><u>What Students Figure Out</u></p>

- a. Plants use energy from the sun to make their own food and therefore in the absence of sunlight, plants cannot make food. (CCC: Energy & Matter: Energy can be transferred in various ways and between.)
- b. Plants get the matter to make food from air and water from the environment. (CCC: Energy & Matter: Matter is transported into, out of, and within systems.)

### Formal Assessment Title

Conditions for Plant Growth

### Assessment Description

Students are presented with plants that they watch over time in various conditions of light (lights or sun, light or dark, nearness to direct sunlight). The data from the experiments will give students the opportunity to describe the pattern of the role that light plays in plant growth.

### 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.]

### AG(s) Code(s) & Description(s)

**A9.** Analyze and interpret data to determine the role of sunlight in the process of making food by plants.

**A10.** Engage in argument from evidence about the role of sunlight in the process of making food by plants.

### Evidence Statement(s)

- Describe patterns in data related to the role of sunlight in the process of making food by plants.
- Use data to answer questions related to the role of sunlight in the process of making food by plants.
- Use evidence, data, or a model to support an argument about the role of sunlight in the process plants use to make food.

### Phenomenon or Phenomenon-rooted Design Problem

- Students determine the effects of various light sources on plant growth. They will observe plant responses to varying degrees of available light.

### General Scenario Description (overview for teacher)

Students are in a science class in which they will observe how various light sources affect growth under various light conditions. In the first class, plants are grown under natural and artificial light. In the second, plants are grown on a shelf, a windowsill, and in a closet. The data collected includes leaf health (i.e., color) and rate of plant growth based on height. Students will use three sets of data to determine the best placement for growing plants in a classroom model. Finally, this data collection will be used to support the phenomena that all plants need sunlight for growth.

## Chain of Sensemaking

- Students are introduced to a scenario related to a school club’s intention to grow vegetables. The students must determine the best growing conditions for the seedlings to grow in the classroom.
- Students interpret and explain the results of several experiments related to the growth of plants under various light conditions.
- Students analyze and interpret a data chart that shows varying degrees of leaf development, leaf color, and stem growth (height and direction).
- Students create an argument that supports their placements of the plants in a map of a classroom, based on data.
- Finally, students use the data evidence to create an argument about the role of sunlight in the relationship between energy and plant growth.

## Work Products

- Short constructed response to demonstrate understanding of the sample data collection chart
- Completed diagram showing where a variety of plants have grown in a classroom based on observation of photographs of the plants and prior knowledge
- Short constructed response to make a claim supporting plant placement in the diagram

## 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 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 checked="" type="checkbox"/> Highlight or emphasize key elements in text, graphics, diagrams, formulas</li><li><input 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 type="checkbox"/> Give explicit prompts for each step in a sequential process</li></ul>	<ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Solve problems using a variety of strategies</li><li><input checked="" type="checkbox"/> Sentence starters</li><li><input checked="" type="checkbox"/> Embed prompts to “show and explain your work”</li></ul>

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

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- **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.
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### Unit 2 Vocabulary

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|--------------|----------------|--------------------|
| • Conditions | • Plant matter | • Artificial light |
| • Energy     | • Plant growth | • Natural light    |
| • Matter     | • Organisms    |                    |
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