



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

**Grade 5 Science**

**Unit 2 Task 1 Specification Tool & Verification of Alignment**

**Matter and Energy in Organisms and Ecosystems**

**September 2023**

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# SIPS Grade 5 Unit 2 Task 1 Specification & Verification of Alignment

Grade: 5	Unit: 2	Task Number: 1	Task Title: What it Takes to Grow
<b>NGSS Performance Expectations</b>			
<p><b>5-LS1-1.</b> Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]</p> <p><b>5-PS3-1.</b> 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.]</p>			
<b>Phenomena or Phenomena-rooted Design Problem</b>			
<ul style="list-style-type: none"><li>Plants get the materials they need for growth chiefly from air and water and the energy they acquire from food was once energy from the sun.</li></ul>			
<b>Scenario/Context/Situation/Boundaries</b>			
<ul style="list-style-type: none"><li>The scenario presents the phenomenon of the growth of a large adult plant from a tiny seed.</li><li>Students evaluate data from an experiment on plant growth and identify how the data develops a claim about the relationship between soil and plant growth.</li><li>Students describe the reasoning that links the evidence/data to the claim.</li><li>Students are provided a description of a produce and herbivore (animal) relationship and identify sunlight as the animal's original energy source.</li><li>Students complete a model to show the transfer of energy across the components of the model.</li><li>Students generate reasoning for why the model supports a hypothesis relating to energy needs within a single organism (i.e., rabbit).</li></ul>			
<b>Variable Features to Shift Complexity or Focus</b>			
<ul style="list-style-type: none"><li>Complexity of scientific concept(s) to be modeled.</li><li>Phenomenon addressed in the scenario, including but not limited to:<ul style="list-style-type: none"><li>Oxygen gas is part of air.</li><li>Plants need some substances (e.g., carbon dioxide in the air) but not others (e.g., soil) to grow.</li><li>Molecules of water are used in photosynthesis.</li><li>Plants increase in mass.</li><li>Plants increase in height.</li></ul></li></ul>			

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- The amount and degree to which evidence is provided that supports a provided claim.
  - Domain-specific vocabulary and definitions.
  - Format of "real-world" phenomenon under investigation: image, data, text, combination.
  - Number, type, and complexity of representations of models (e.g., energy transfer from the sun to other organisms, a set of models of energy transfer from the sun to other organisms).
  - Features of model(s) to be identified.
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### **General Description of Task/Chain of Sensemaking**

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- Students use information in a data table about plant growth over time involving matter used by the plant for growth to generate a claim about what plants need to grow. **[Prompt 1: 5-LS1-1, KSA6]**
  - Students generate reasoning for why a description of an interaction between a plant and animal supports or refutes a hypothesis relating to matter transfer between organisms. **[Prompt 2: 5-LS1-1 & 5-PS3-3, KSA1]**
  - Students complete a model relating to energy transfer between the sun, plants, and animals. **[Prompt 3: 5-LS1-1 & 5-PS3-3, KSA2]**
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### **Targeted PE-related KSAs**

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**5-LS1-1 KSA6:** Support an argument with relevant data that plants get the materials they need for growth chiefly from air and water.

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### **Cross-performance Expectations Related KSAs to Target**

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**5-LS1-1 & 5-PS3-3, KSA1:** Identify and/or describe the relevant relationships between components in a model showing the relationship between plants and animals and the materials they need for growth.

**5-LS1-1 & 5-PS3-3, KSA2:** Identify and/or describe the relevant relationships between components in a model showing the relationship between plants and the energy they get from sunlight to produce food for growth.

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### **Student Demonstrations of Learning**

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- Describes the given evidence, data, and/or models that support the claim.
  - Determines whether the evidence supports the claim.
  - Model correctly uses provided information to show the flow of energy within a group of living things.
  - Correctly uses a model to show how variables affect the flow of energy.
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### **Work Products**

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- Interpretation and/or representation of data (e.g., diagrams, flowcharts).
  - Support an argument with evidence, data, or a model.
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- Complete a model.
- Development of or use of a model to describe phenomena.
- Constructed response.

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

**SIPS Assessments Complexity Framework Components**

Prompt	A.1 Degree and nature of sense-making about phenomena or problems			B.1 Complexity of the presentation			B.2 Cognitive demand of response development			B.3 Cognitive demand of response production		
	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
<b>1</b>		<b>X</b>			<b>X</b>			<b>X</b>			<b>X</b>	
<b>2</b>	<b>X</b>			<b>X</b>				<b>X</b>			<b>X</b>	
<b>3</b>		<b>X</b>			<b>X</b>			<b>X</b>			<b>X</b>	

### Rubric Considerations

- Accuracy of the model (including the scale).
- Sophistication of the explanations.
- Completeness and accuracy of response.

### Assessment Boundaries

- Assessment does not include molecular explanations of the movement of matter among plants, animals, decomposers, and the environment.
- Assessment does not include molecular explanations or the biochemical mechanisms of photosynthesis.

### Common Alternate Conceptions

- **5-LS1-1**
  - Plants absorb soil.
  - Increasing water levels always increases plant growth.
  - Plants do not need air (or gases in the air) to survive.
  - Plants must be grown in soil.
- **5-PS3-1**
  - 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.

### Possible Technical Terms for Task

- energy, matter, system, organism, biotic, abiotic

### Common Core State Standards for Literacy

#### Reading Informational

- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. **(5-LS1-1)**
- **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. **(5-PS1-1)**
- **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. **(5-LS1-1)**

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**Writing**

- **W.5.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information. **(5-LS1-1)**
- **W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work and provide a list of sources. **(5-PS1-3)**

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**Common Core State Standards for Mathematics**

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**Mathematical Practice**

- **MP.2.** Reason abstractly and quantitatively. **(5-LS1-1), (5-PS1-3)**
- **MP.4.** Model with mathematics. **(5-LS1-1)**
- **MP.5.** Use appropriate tools strategically. **(5-LS1-1)**

**Mathematics**

- **5.MD.A.1** Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. **(5-LS1-1)**

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**Task Notes**

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## SIPS Assessments Complexity Framework

Component	Complexity		
	Low	Moderate	High
<b>Connections to Curriculum and Instruction</b>	<p><b>A.1 Degree and nature of sense-making about phenomena or problems</b></p> <ul style="list-style-type: none"> <li>Requires one or two dimensions</li> <li>One dimension may have a greater degree of emphasis than another</li> <li>Requires previously learned ideas or concepts</li> </ul>	<ul style="list-style-type: none"> <li>Requires integration of two dimensions in the service of sense-making</li> <li>Requires integration of same or different combinations of dimensions as represented in the PE bundle</li> <li>Requires a combination of previously learned ideas or concepts and newly presented information</li> </ul>	<ul style="list-style-type: none"> <li>Requires integration of three dimensions in the service of sense-making</li> <li>Requires integration of same or different combinations of dimensions as represented in the PE bundle</li> <li>Requires a combination of previously learned ideas or concepts and newly presented information</li> </ul>
<b>Characteristics of the Tasks</b>	<p><b>B.1 Complexity of the presentation</b></p> <ul style="list-style-type: none"> <li>The amount and type of information provided in the scenario supports limited simple connections among ideas or concepts</li> <li>Provides few, simple graphics/data/models</li> <li>Includes definitions or examples</li> <li>Phenomenon or problem presented in a concrete way with high level of certainty</li> </ul>	<ul style="list-style-type: none"> <li>The amount and type of information provided in the scenario supports multiple evident connections among ideas or concepts</li> <li>Provides graphics/data/models</li> <li>Limited use of definitions or examples</li> <li>Phenomenon or problem presented with some level of uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>The amount and type of information provided in the scenario supports multiple and varied complex connections among ideas or concepts</li> <li>Provides complex graphics/data/models</li> <li>Phenomenon or problem presented with high degree of uncertainty</li> </ul>
	<p><b>B.2 Cognitive demand of response development</b></p> <ul style="list-style-type: none"> <li>Requires well-defined set of actions or procedures</li> <li>Requires a connection or retrieval of factual information</li> <li>Response requires a low level of sophistication with routinely encountered well-practiced applications</li> </ul>	<ul style="list-style-type: none"> <li>Requires application of ideas and practices given cues and guidance</li> <li>Requires drawing relationships and connecting ideas and practices</li> <li>Response requires a moderate level of sophistication with typical but relatively complex representation of ideas and application of skills</li> </ul>	<ul style="list-style-type: none"> <li>Requires selection and application of multiple complex ideas and practices</li> <li>Requires high degree of sense-making, reasoning, and/or transfer</li> <li>Response requires a high level of sophistication with non-routine or abstract representation of ideas and application of skills</li> </ul>

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**B.3 Cognitive demand  
of response production**

- Responses include selection from a small set of options presented as text (e.g., word, short phrase) or other formats (e.g., a simple graphic or process)

- Responses include one or more sentences or a paragraph, a moderately complex graphic, or multiple steps in a simple or moderately complex process

- Responses include multiple paragraphs, multiple graphics of at least moderate complexity, or multiple steps in a complex process
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