



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

**Grade 5 Science**

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

**Matter and Energy in Organisms and Ecosystems**

**September 2023**

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

Grade: 5	Unit: 2	Task Number: 2	Task Title: Our Friend the Worm
<b>NGSS Performance Expectations</b>			
<p><b>5-LS2-1.</b> Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. <i>[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.]</i></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. <i>[Clarification Statement: Examples of models could include diagrams and flow charts.]</i></p>			
<b>Phenomena or Phenomena-rooted Design Problem</b>			
<ul style="list-style-type: none"><li>• The role of decomposers in recycling matter into the soil, which along with energy from the sun helps plants grow.</li></ul>			
<b>Scenario/Context/Situation/Boundaries</b>			
<ul style="list-style-type: none"><li>• The scenario introduces an example of rotting food, decomposition.</li><li>• Students develop and use a model relating to matter transfer between decomposers, plants, and animals.</li><li>• Students complete a model showing the cycling of energy throughout an ecosystem.</li><li>• Students use the model to describe the transfer of energy across components of the model.</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>• Domain-specific vocabulary and definitions.</li><li>• The interaction between components.</li><li>• Contexts include, but are not limited to:<ul style="list-style-type: none"><li>○ Models of energy or matter exchange (e.g., food web, food pyramid).</li></ul></li><li>• 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).</li><li>• Features of model(s) to be identified.</li></ul>			

## General Description of Task/Chain of Sensemaking

- Students complete a model relating to matter transfer between decomposers, plants, and animals. **[Prompt 1, Part A: 5-LS2-1, KSA5]**
- Students use a model relating to matter transfer between decomposers, plants, and animals to explain or predict a scientific event. **[Prompt 1, Part B: 5-LS2-1, KSA4]**
- Students are asked to predict the impact of the removal of a component, producers, consumers, or decomposers, from an ecosystem. **[Prompt 2: 5-LS2-1, KSA2]**
- Students complete a model to represent energy transfer across plants, animals, and decomposers. **[Prompt 3, Part A: 5-PS3-1, KSA1]**
- Students support a claim relating the process of the matter and energy cycles from the sun, nutrients in the soil, and plant growth. **[Prompt 3, Part A: 5-PS3-1, KSA2]**

## Targeted PE-related KSAs

**5-LS2-1, KSA5:** Develop a model using an analogy, example, or abstract representation to describe the movement of matter among plants, animals, decomposers, and the environment.

**5-LS2-1, KSA4:** Use a provided model to describe the components' (plants, animals, decomposers) relationships, and interactions among the organisms within a system.

**5-LS2-1, KSA2:** Describe the relationship of components in an ecosystem.

**5-PS3-1, KSA1:** Develop and or use a model with provided information (i.e., a specific mammal, insect, set of living things, sun) to show that energy from the sun is transferred to animals through a chain of events that begins with plants producing food and then being eaten by animals.

## Cross-performance Expectations Related KSAs to Target

**5-LS2-1 & 5-PS3-1, KSA1:** Develop or use a model to show that all of the energy that animals use for body repair, growth, motion, and body warmth maintenance is energy that once came from the sun.

**5-PS3-1, KSA2:** Support a claim with evidence related to the cycle of decomposing organic matter, which once used energy from the sun to grow, deposits nutrients later used by plants to grow.

## Student Demonstrations of Learning

- Accurately describes the relationship of the components for a given phenomenon.
- Develops a model to accurately represent the cycling of matter in the system between plants, animals, decomposers, and the environment.
- Explains the relevance of each component in an ecosystem.
- Model correctly uses provided information to show the flow of energy within a group of living things.
- Describes the given evidence, data, and/or models that support the claim.
- Determines whether evidence supports the claim.

## Work Products

- Interpretation and/or representation of data (e.g., diagrams, flowcharts).
- Support an argument with evidence, data, or 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 Part A</b>		X			X			X		X		
<b>1 Part B</b>		X		X				X				X

2	X	X		X	X
3	X		X	X	X

### 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-LS2-1**
  - 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.
- **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, cycle, environment, nutrients, decomposer, waste

### Common Core State Standards for Literacy

#### Reading Informational

- **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-PS3-1), (5-LS2-1)**

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**Writing**

- **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-PS3-1)**

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**Common Core State Standards for Mathematics**

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**Mathematical Practice**

- **MP.2.** Reason abstractly and quantitatively **(5-PS3-1), (5-LS2-1)**
- **MP.4.** Model with mathematics. **(5-LS2-1)**

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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., or 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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