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**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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| **Grade: 5** | **Unit: 2** | **Task Number: 1** | |  | **Task Title: What it Takes to Grow** | |
| **NGSS Performance Expectations** | | | | | | |
| **5-LS1-1.** 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.]  **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.] | | | | | | |
| **Phenomena or Phenomena-rooted Design Problem** | | | | | | |
| * 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. | | | | | | |
| **Scenario/Context/Situation/Boundaries** | | | | | | |
| * The scenario presents the phenomenon of the growth of a large adult plant from a tiny seed. * 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. * Students describe the reasoning that links the evidence/data to the claim. * Students are provided a description of a produce and herbivore (animal) relationship and identify sunlight as the animal's original energy source. * Students complete a model to show the transfer of energy across the components of the model. * Students generate reasoning for why the model supports a hypothesis relating to energy needs within a single organism (i.e., rabbit). | | | | | | |
| **Variable Features to Shift Complexity or Focus** | | | | | | |
| * Complexity of scientific concept(s) to be modeled. * Phenomenon addressed in the scenario, including but not limited to:   + Oxygen gas is part of air.   + Plants need some substances (e.g., carbon dioxide in the air) but not others (e.g., soil) to grow.   + Molecules of water are used in photosynthesis.   + Plants increase in mass.   + Plants increase in height. * 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. | | | | | | |
| **General Description of Task/Chain of Sensemaking** | | | | | | |
| * 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]** | | | | | | |
| **Targeted PE-related KSAs** | | | | | | |
| **5-LS1-1 KSA6:** Support an argument with relevant data that plants get the materials they need for growth chiefly from air and water. | | | | | | |
| **Cross-performance Expectations Related KSAs to Target** | | | | | | |
| **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. | | | | | | |
| **Student Demonstrations of Learning** | | | | | | |
| * 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. | | | | | | |
| **Work Products** | | | | | | |
| * Interpretation and/or representation of data (e.g., diagrams, flowcharts). * Support an argument with evidence, data, or a model. * 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/**](https://udlguidelines.cast.org/) **)** | | | | | | |
| **Multiple Means of Engagement** | | | **Multiple Means of Representation** | | | **Multiple Means of Action & Expression** |
| * Context or content. * Age appropriate. * Appropriate for different groups. * Makes sense of complex ideas in creative ways. * Vary the degree of challenge or complexity within prompts. | | | * Provide visual diagrams and charts. * Make explicit links between information provided in texts and any accompanying representation of that information in illustrations, equations, charts, or diagrams. * Activate relevant prior knowledge. * Highlight or emphasize key elements in text, graphics, diagrams, and formulas. * Use outlines, graphic organizers, unit organizer routines, concept organizer routines, and concept mastery routines to emphasize key ideas and relationships. * Give explicit prompts for each step in a sequential process. | | | * Solve problems using a variety of strategies. * Sentence starters. * Embed prompts to “show and explain your work”. |
| **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 | | **1** |  | **X** |  |  | **X** |  |  | **X** |  |  | **X** |  | | **2** | **X** |  |  | **X** |  |  |  | **X** |  |  | **X** |  | | **3** |  | **X** |  |  | **X** |  |  | **X** |  |  | **X** |  | | | | | | | |

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| **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)**   **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)** |
| **Common Core State Standards for Mathematics** |
| **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)** |
| **Task Notes** |
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SIPS Assessments Complexity Framework

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| **Component** | | **Complexity** | | | | | |
| **Low** | **Moderate** | | | **High** | |
| **Connections to Curriculum and Instruction** | **A.1 Degree and nature of sense-making** **about phenomena or problems** | * Requires one or two dimensions * One dimension may have a greater degree of emphasis than another * Requires previously learned ideas or concepts | | * Requires integration of two dimensions in the service of sense-making * Requires integration of same or different combinations of dimensions as represented in the PE bundle * Requires a combination of previously learned ideas or concepts and newly presented information | | * Requires integration of three dimensions in the service of sense-making * Requires integration of same or different combinations of dimensions as represented in the PE bundle * Requires a combination of previously learned ideas or concepts and newly presented information | |
| **Characteristics of the Tasks** | **B.1 Complexity of the presentation** | * The amount and type of information provided in the scenario supports limited simple connections among ideas or concepts * Provides few, simple graphics/data/models * Includes definitions or examples * Phenomenon or problem presented in a concrete way with high level of certainty | | * The amount and type of information provided in the scenario supports multiple evident connections among ideas or concepts * Provides graphics/data/models * Limited use of definitions or examples * Phenomenon or problem presented with some level of uncertainty | | * The amount and type of information provided in the scenario supports multiple and varied complex connections among ideas or concepts * Provides complex graphics/data/models * Phenomenon or problem presented with high degree of uncertainty | |
| **B.2 Cognitive demand of response development** | * Requires well-defined set of actions or procedures * Requires a connection or retrieval of factual information * Response requires a low level of sophistication with routinely encountered well-practiced applications | | | * Requires application of ideas and practices given cues and guidance * Requires drawing relationships and connecting ideas and practices * Response requires a moderate level of sophistication with typical but relatively complex representation of ideas and application of skills | | * Requires selection and application of multiple complex ideas and practices * Requires high degree of sense-making, reasoning, and/or transfer * Response requires a high level of sophistication with non-routine or abstract representation of ideas and application of skills | |
| **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 | |