



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 5 Science Unit 2 End of Unit Assessment Unpacking Tools Matter and Energy in Organisms and Ecosystems July 2023

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SIPS Grade 5 Unit 2 End of Unit Assessment Unpacking Tools

NGSS Performance Expectation: 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.]

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Foundations	<p>SEP: Engaging in Argument from Evidence Support an argument with evidence, data, or a model.</p>	<p>LS1.C: Organization for Matter and Energy Flow in Organisms Plants acquire their material for growth chiefly from air and water.</p>	<p>CCC: Energy and Matter Matter is transported into, out of, and within systems.</p>
Key Aspects	<ul style="list-style-type: none"> ● Compare and refine arguments based on an evaluation of the evidence presented. ● Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation. ● Respectfully provide and receive critique from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions. ● Construct and/or support an argument with evidence, data, and/or a model. ● Use data to evaluate claims about cause and effect. ● Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. ● Identify evidence that supports a claim. 	<ul style="list-style-type: none"> ● Plant growth over time. ● Changes in the weight of soil and water within a closed system with plants. ● Soil does not provide most of the material for plant growth (e.g., changes in weight of soil and a plant in a pot over time, hydroponic growth of plants). ● During plant growth in soil, the weight of the soil changes very little over time, whereas the weight of the plant changes a lot. Additionally, some plants can be grown without soil at all. ● Because some plants don't need soil to grow, and others show increases in plant matter (as measured by weight) but not accompanying decreases in soil matter, the material from the soil must not enter the plant in sufficient quantities to be the chief contributor to plant growth. ● Plants do not acquire most of the material for growth from soil. ● A plant cannot grow without water or air. Because both air and water are matter and are transported into the plant system, they can provide the materials plants need for growth. ● Since soil cannot account for the change in weight as a plant grows and since plants take in water and air, both of which could contribute to the increase in weight during 	<ul style="list-style-type: none"> ● Matter is transported into, out of, and within systems. ● Matter flows and cycles can be tracked in terms of the weight of substances before and after a process occurs. The total weight of the substances does not change (Conservation of matter). ● Energy can be transferred in various ways and between objects.

		<p>plant growth, plant growth must come chiefly from water and air.</p>	
<p>Prior Knowledge</p>	<ul style="list-style-type: none"> ● Identify arguments that are supported by evidence. ● Distinguish between explanations that account for all gathered evidence and those that do not. ● Analyze why some evidence is relevant to a scientific question and some is not. ● Distinguish between opinions and evidence in one’s own explanations. ● Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument. ● Construct an argument with evidence to support a claim. ● Make a claim about the effectiveness of an object, tool, or solution that is supported by relevant evidence. 	<ul style="list-style-type: none"> ● Animals obtain food they need from plants or other animals. ● Plants depend on water and light to grow. ● Air is matter. ● Matter is made of particles. 	<p>Relationships to SEPs:</p> <p>7) Engaging in Argument from Evidence and 2) Developing and Using Models</p> <ul style="list-style-type: none"> ● Matter is made of particles and energy can be transferred in various ways and between objects. Students observe the conservation of matter by tracking matter flows and cycles before and after processes and recognizing the total weight of substances does not change. ● Objects may break into smaller pieces, be put together into larger pieces, or change shapes. ● Support an argument with evidence, data, or a model. ● Models can be used to show the role of air and water in a plant’s growth.

NGSS Performance Expectation: 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.]**

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Foundations	<p>SEP: Developing and Using Models Develop a model to describe phenomena.</p>	<p>LS2.A: Interdependent Relationships in Ecosystems The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back into the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.</p> <p>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.</p>	<p>CCC: Systems and System Models A system can be described in terms of its components and their interactions.</p>
Key Aspects	<ul style="list-style-type: none"> ● Identify limitations of models. ● Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regularly occurring events. ● Develop a model to represent mechanisms, relationships, and connections to illustrate, explain or predict a scientific event. ● Develop and/or use models to describe and/or predict phenomena. 	<ul style="list-style-type: none"> ● The food of almost any animal can be traced back to plants. ● Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. ● Decomposers restore (recycle) some materials back to the soil. ● Matter cycles between the air and soil and among organisms as they live and die. ● A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. 	<ul style="list-style-type: none"> ● A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. ● A system can be described in terms of its components and their interactions. ● Model the flow of energy and the transfer of biomass between organisms in a food web.

	<ul style="list-style-type: none"> ● Use a model to describe cause-and-effect relationships or interactions concerning the functioning of a natural or designed system. 	<ul style="list-style-type: none"> ● Newly introduced species can damage the balance of an ecosystem. ● Changes in a previously stable environment affect the matter flow/energy cycle among the original plants, animals, and decomposers in the system. 	
Prior Knowledge	<ul style="list-style-type: none"> ● Distinguish between a model and the actual object, process, and/or events the model represents. ● Compare models to identify common features and differences. ● Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s). ● Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. ● Develop a simple model based on evidence to represent a proposed object or tool. 	<ul style="list-style-type: none"> ● Plants depend on water and light to grow, and also depend on animals for pollination or to move their seeds around. ● Animals obtain food they need from plants or other animals. Plants need water and light. ● Living things need water, air, and resources from the land, and they live in places that have the things they need. 	<p>Relationships to SEPs:</p> <p>2) Developing and Using Models and 7) Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> ● Objects and organisms can be described in terms of their parts ● Systems in the natural and designed world have parts that work together. ● Support an argument that makes a claim that organisms' needs are met completely by their ecosystem. ● Use evidence to support an argument based on a model which describes how matter cycles in an ecosystem.

NGSS Performance Expectation: 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.]**

	Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Foundations	<p>SEP: Developing and Using Models Use models to describe phenomena.</p>	<p>PS3.D: Energy in Chemical Processes and Everyday Life The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).</p> <p>LS1.C: Organization for Matter and Energy Flow in Organisms Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and motion. (secondary).</p>	<p>CCC: Systems and System Models Energy can be transferred in various ways and between objects.</p>
Key Aspects	<ul style="list-style-type: none"> Use a model to collect evidence to reason qualitatively or quantitatively about concepts and relationships represented in the model. Develop a model using an analogy, example, or abstract representation to describe energy in animals' food used to survive. Understand the model of energy flow in everyday occurrences. Test cause and effect relationship when there is a change agent in the flow of energy. Construct and/or support an argument with evidence, data, and/or model the flow of energy with animals. 	<ul style="list-style-type: none"> Animals need energy so they can stay warm, grow, and move to get what is needed to survive (Food, water, air, and space). Sunlight is the original source of energy for all life on Earth. The storage of energy as plant matter is a chemical process involving air and water. Account for losses in energy from the Sun to trophic levels as being due to this energy use. 	<ul style="list-style-type: none"> Pattern of the flow of energy to show relationships between animals and their food. Cause and effect of energy can be simple or complex. Stability and change and how they impact the flow of energy. Identify the ways that energy is transferred between objects.
Prior Knowledge	<ul style="list-style-type: none"> Identify arguments supported by evidence. Listening actively to arguments to determine if they agree or disagree and the reason why. Make a claim about the effectiveness of an event that is supported by relevant evidence. Construct an argument with evidence to support their claim. 	<ul style="list-style-type: none"> Energy can be moved from place to place. All animals need food in order to live and grow. Animals obtain food they need from plants or other animals. Food provides animals with the materials and energy they need for body repair, growth, warmth, and motion. 	<p>Relationships to SEPs:</p> <p>2) Developing and Using Models and 7) Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Understand model development (concrete to abstract). Energy needs to flow. Understanding of a simple food chain, but not a complex food web. Understanding that change in energy happens from many possible sources

(weather, human intervention, habitat change).

- A change impacts energy.
- Use evidence to support an argument related to how the energy for motion and/or body warmth in animals comes from food.
- Use evidence to support an argument that energy released from food was once energy from the sun.