Essential Questions for the Target Level
- Does the student understand that the food for most animals can be traced back to plants?
- Does the student understand that matter cycles between the air and soil and among plants and animals?
- Does the student understand that matter that is not food is changed by plants into matter that is food?
- How can the movement of matter through living things be described in a model?

Target Level Name	Target Level Description
EE.5.LS2-1.T	Create food-chain models and use food-chain models to trace matter from the environment to plants, through living things, from animals' food to plants, and from the soil to plants to animals and back to the soil.

Vocabulary		Misconceptions
Concepts	movement of matter in an ecosystem	(SCI-309) The student does not understand that the arrow shows the direction of matter movement. (SCI-7) The student does not recognize indirect relationships in a food chain/web containing more than two organisms. (SCI-7) The student views the relationships in food webs as simple cause and effect relationships (eating and growing) rather than of the movement of matter within an ecosystem. (SCI-307) The student thinks dead things decay naturally without the action of decomposers. (SCI-307) The student thinks that dead things disappear. (SCI-311) The student does not understand that air is matter (i.e., believes air does not have weight or take up space). (SCI-311) The student believes that plants get matter (i.e., food) from soil or fertilizer (i.e., plant food provided by people).
Words	food chain, plant, soil	

Progression Information	Phenomenon	Wonder Question	Science and Engineering Practices
Food-chain models are used to trace matter in animals' food back to plants (LS2.A & Developing and Using Models) -> Create a model that shows how matter moves through living things (LS2.A & Developing and Using Models) -> Understand that matter moves from soil to plants to animals and back to soil (LS2.B) -> Recognize that plants get matter from air (LS2.B) ->	General mechanism: Plants get matter mainly from air and water. Plants get nutrients from soil (i.e., minerals). Matter moves through ecosystems as plants make their own food, plants are eaten by animals, animals eat other animals, and dead things are broken down by decomposers to make matter available to plants again. Not all matter is passed to the next level; some matter leaves at each level (e.g., excretion, breathing). Examples of systems include specific organisms or ecosystems. Example Phenomena: In a forest, oak trees grow. Oak trees make their own food with matter from air and water. Oak trees take in air through openings in their leaves. Oak trees also get nutrients from the soil. Squirrels eat leaves and acorns from the oak tree. Owls eat squirrels. Dead animals and leaves are broken down by worms and become part of the soil.	The wonder question is presented at the beginning and revisited at the end of the testlet. The wonder question connects to a research-based misconception that can be resolved through inquiry activities in the testlet. Example: What would happen to animals if all the plants died? Two answer options are presented, one of which is a common misconception. Example: AO1 - Animals that eat other animals would survive. (misconception) AO2 - No animals would survive. Over the course of the testlet, students should gain information that will help them reevaluate the wonder question at the end of the testlet. The flow of items should build to items closely related to the wonder question answer.	*Developing and Using Models* Students create models (e.g., food chain/web) that describe the movement of matter through living things. They use the models to trace the matter in animals' food back to plants. Food chain/web models use arrows to show the direction that matter moves between two living things. Animals eat organisms that they are directly connected to in the chain/web. Organisms depend on organisms that are directly connected in the chain/web as well as those that are indirectly connected because the same matter moves across the entire food chain.

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UDL Options	
Principle	**Guideline: Description**
Representation	Language & Symbols: Vocabulary support (i.e., definitions of terms from earlier nodes in the map, multiple representations). Language & Symbols: Use of video and/or images to support decoding. Language & Symbols: Language in science narrative is concise and appropriately complex given grade level and linkage level. Items provide student clear directives and expectations to demonstrate knowledge and understanding. Comprehension: Science narrative provides background knowledge, big ideas, and relationships Information may be accessed through physical scale models (e.g., tactile displays) and/or computer-generated models. Represent relationships with diagrams representing only the most relevant information.
Engagement	Recruiting interest: Phenomenon is a common, high-interest situation that a student might experience, makes connections to the real world. Pedagogically relevant, age-appropriate contexts for testlets optimize relevance, value, and authenticity. Self-regulation: Wonder question follows engagement activity and ties to typical misconception. Return to wonder question at the end of the testlet. Self-regulation: Model reflective practice (i.e., think aloud) question at end of testlet such as "Did the testlet show what I know?" or "How did I like it?" Items asking students to reflect on performance develop self-assessment and reflection.
Action & Expression	Expression & Communication: Variety of item response types included, such as multiple-choice, drag and drop, and multiple-select multiple choice. Executive Functions: Data is presented in tables or graphs to facilitate organization and managing of information. Executive Functions: Questions embedded in science narrative inquiry activity to support strategy development, such as ‘‘What should you do next?’’ or ‘‘How would you find this answer?’’

Target linkage level nodes

Nodes should be presented in the testlet in an order that creates a logical flow in inquiry activity, which may differ from the order that they occur in the map.

Nodes (order from map)	**Description**	**Observation & Example Questions to Ask**
SCI-309 Use a model to trace matter in animals' food to plants.	Linking node Integrated Node 4 items Use a model to trace the matter in animals' food back to plants.	The student is presented with a simple food web (e.g., grass -> rabbit -> fox). The student identifies that the matter in the fox's food came from grass. Example Questions: What does the model show about how the [organism] gets matter? Which model shows how [organism] gets matter?
SCI-7 Create a model that shows the movement of matter through living things.	Integrated Node 3 items Create a model that shows the movement of matter (e.g. plant growth, eating, composting) through (three or more) living things.	The student is shown a partially complete food-chain model (e.g., one organism or arrow is missing). The student is asked to fill in the missing item based on the description of the feeding relationships from an engagement activity story. Example Questions: Which food chain shows how matter moves? Put the plants and animals in the correct box to show how matter moves [drag and drop item]. What goes between [organism1] and [organism2] to show how matter moves [AOs are types of arrows]?
SCI-307 Recognize that matter moves from the soil to plants to animals and back to the soil.	DCI Node 3 items Recognize that matter moves from the soil to plants to animals and back to the soil.	When shown an example of a cycle food web (e.g., grass -> rabbit -> fox -> worm) the student identifies that the web shows that matter moves from grass to rabbit to fox to worm to soil. The student identifies that plants get nutrients from the soil, but not matter. [Note: Confusing food and nutrients is a misconception. Nutrients for plants are like vitamins for people.] Example Questions: What does the model show about how the [organism] gets matter? What does [character's] food chain show about matter?
SCI-311 Recognize that plants get matter from the air.	DCI Node 3 items Recognize that plants get matter from the air (i.e., carbon dioxide).	When asked, "How does a plant get material it needs to grow?", the student indicates that plants get matter (carbon dioxide) from the air. For example, when asked, "How does a tree get material it needs to grow?", the student indicates that trees take in air through their leaves to get the material they need to grow. Example Questions: What helps a [plant] get matter? How does [plant] get matter to grow? How does a [plant type] take in the material it needs to grow? What is the material that [plant type] uses to grow?