Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA) Project

Grade 5 Unit 2: Matter and Energy in Organisms and Ecosystems

Family Guidance and Learning Resources for Performance Category 3

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Purpose

The purpose of this document is to help families understand their student's performance on the Grade 5 Unit 2 Science Assessment and to provide resources and recommendations for engaging their student in science learning at home.

Unit Overview

By engaging in this unit, students deepen their knowledge of the interconnectedness of organisms and environments within ecosystems and how matter cycles and energy flows within these ecosystems that enable living things to grow and survive. Students develop their experience and skills with evaluation and explanation through constructing explanations, models, and arguments.

Performance Category 3: Model Energy Flow and Matter Cycle Among a System of Plants, Animals, and Decomposers

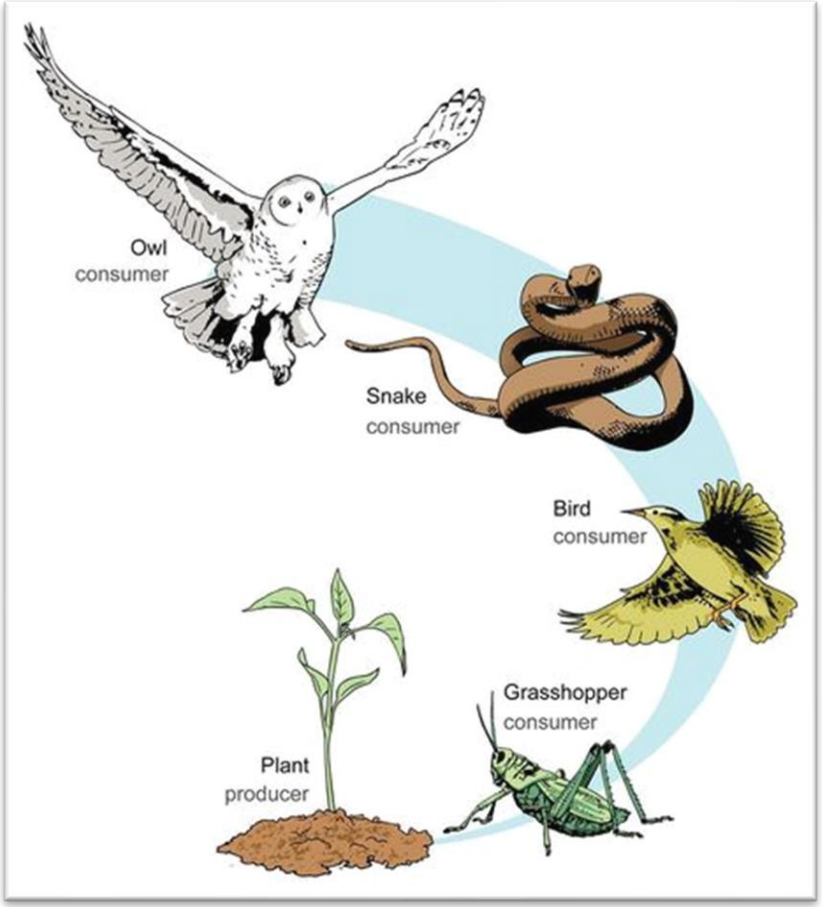
Prompts for this performance category require students to develop or use models to support descriptions and predictions of relationships about:

- sunlight as the original source of energy for all life on Earth
- the role of plants, animals, and decomposers in the transfer of energy and movement of matter in an ecosystem
- the movement of matter and energy among plants, animals, and decomposers

Instructions for Parents/Guardians

1. Refer to your student's score report to determine their instructional needs level—green, yellow, or red—for this performance category.
2. Use the Interpretive Guidance (see page 2) to understand what your student likely knows and is able to do based on their instructional needs level.
3. Use the Family Resources and Recommendations (see pages 3-5) to engage with and support your student's science learning at home.

Grade 5 Unit 2: Matter and Energy in Organisms and Ecosystems



Interpretive Guidance for Performance Category 3: Model Energy Flow and Matter Cycle Among a System of Plants, Animals, and Decomposers		
Red (0-5 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (6-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
What These Results Mean		
This student is likely able to: • Present **incomplete and/or inaccurate** representations related to the movement of matter and/or the transfer of energy in an ecosystem. • Present **incomplete and/or inaccurate** explanations about the cycling of matter or flow of energy in an ecosystem. • Demonstrate **partial** understanding of the relationships among components of an ecosystem and **show limited understanding** of how matter cycles or energy flows through organisms and ecosystems.	**This student is likely able to:** • Present **clear and complete** representations with **minor errors** related to the movement of matter among plants, animals, decomposers, and the environment, and how energy in animals' food was once energy from the sun. • Use the model to develop **incomplete but accurate** explanations about the cycling of matter or flow of energy in an ecosystem. • Demonstrate **partial** understanding of the relationships among components of an ecosystem and **apply some of these concepts** to provide an explanation of how matter cycles or energy flows through organisms and ecosystems.	**This student is likely able to:** • Present **clear, complete, and accurate** representations of the movement of matter among plants, animals, decomposers, and the environment, and they can explain that energy in animals' food was once energy from the sun. • Use a model to develop **thorough and accurate** explanations of the cycling of matter or flow of energy in an ecosystem. • Support a **scientifically accurate and complete** explanation or prediction related to how matter cycles and energy flows through organisms and ecosystems.

Family Resources and Recommendations for Performance Category 3: Model Energy and Matter Flow Among a System of Plants, Animals, and Decomposers	
Resources and Recommendations to Support Science Learning at Home	
Engage in the Topic *What do living things need in an ecosystem?*	A terrarium, a jar sealed with a lid, is a closed environment of living things that can show us how an ecosystem works. Ask your student what they think would happen if a snail is placed in a terrarium with water, soil, and plants representing a pond ecosystem. • Where should the terrarium be placed? • Could a snail live in a sealed glass jar (a terrarium)? • If so, for how long? If not, why not?
Explore the Topic *How can you show or model energy transfer in an ecosystem?* *What are the connections between plants, animals, and decomposers in an ecosystem?*	Energy transfer in an ecosystem is the reason plants and animals can survive on Earth. Click on and discuss this food web and trace several of the food chains within it. State for your student that the arrows indicate the step-by-step transfer of energy or energy flow from one organism to another. Discuss these key points with your student: • Compare and contrast producers (plants) and consumers (animals) in the food web. • Describe the transfer of energy through the food chains in the food web by pointing to the arrows and identifying what-eats-what. Have your student complete this food web model by identifying the plants, animals, and decomposers and discuss the transfer of energy beginning with the sun.
Explain with Evidence *How is energy transferred among an ecosystem's plants, animals, and decomposers?*	Watch Energy Flow in Ecosystems, which presents examples of energy transfer in an ecosystem, and discuss the following questions: • How do different organisms get energy? • How is matter flowing or cycling through the different ecosystems? What role do decomposers have in cycling matter? Use examples from the video to draw a model of a food web showing the flow of matter and transfer of energy (i.e., using arrows) among plants, animals, and decomposers.

Evaluate the Topic *How can I use a terrarium to model a pond ecosystem to show matter flow and energy transfer?*	With the right balance and conditions, an ecosystem inside a terrarium can survive for years! The plants use sunlight, water, and nutrients from the soil to survive. As the plant loses some leaves, they are broken down by bacteria (decomposers) and become nutrients in the soil that cycle back into the ecosystem. Snails have plants and dead leaves to eat and to continue to grow. Ask your student to complete three questions on pages 2-4 of a short assessment about what happens to living things (snails and plants) when placed in a sealed terrarium for 80 days.
Elaborate on the Topic *How can I use a food web to describe the relationship between the organisms in an ecosystem?* *How can I build an ecosystem in a terrarium that could last for years?*	Apply what you know about food webs, ecosystems, and the transfer of energy and flow of matter to discuss the effects on the balance of an ecosystem when: • plants could not get energy from the sun • there are no decomposers • animals begin reproducing quickly and need more food Extension: Do you want to build your own sealed jar ecosystem? Build an ecosystem using this video. Even if you do not want to build a terrarium, this video will help your student better understand how plants and animals can survive in one of many ecosystems under the right, balanced conditions.

Resources

1. Food Chains and Food Webs: What's The Difference? (treehugger.com), Treehugger
   [https://www.treehugger.com/difference-between-food-chains-and-webs-4011388]
2. Example Food Web Worksheet, Teaching Engineering
   [https://www.teachengineering.org/content/cub_/activities/cub_bio/cub_bio_lesson03_activity1_example_food_web_worksheet.pdf]
3. Energy Flow in Ecosystems, Next Generation Science
   [https://youtu.be/LnPRHcp5_vo?si=9UCnbjIvq8FcKTPQ]
4. Sealed Snail Assessment, Stanford NGSS Assessment Project
   [https://docs.google.com/document/d/1rMEkaA9CSA7ppW6qG-RVRJyrdv36uEofkznuZksM94w/template/preview]
5. Build a Tiny Plant World, Crash Course for Kids
   [https://youtu.be/0vu4wdHNo4Q?si=ieBoMJLOx2cqc-jt]