Grasshopper

Life Science | Lesson Guide

5th Grade

Photo Description

A bright green grasshopper sits on top of a dried sunflower seed head, gripping it with its strong legs. The grasshopper has long antennae, large eyes, and brown wings folded along its back. The sunflower head is covered with hundreds of small, dark seeds arranged in a spiral pattern.

Scientific Phenomena

The anchoring phenomenon here is structural adaptation for survival. The grasshopper demonstrates how body structures are perfectly designed for specific functions - its powerful hind legs for jumping, compound eyes for detecting movement, and strong mandibles for chewing plant material. The sunflower represents plant reproduction strategies, with its seeds arranged in mathematical spirals (Fibonacci patterns) to maximize seed packing efficiency. This image captures the intersection of animal feeding behavior and plant reproductive success.

Core Science Concepts

1. Animal Structures and Functions: Grasshoppers have specialized body parts including compound eyes for wide-angle vision, antennae for sensing chemicals and touch, and powerful hind legs for escaping predators.

2. Plant Life Cycles and Reproduction: Sunflowers produce hundreds of seeds arranged in spiral patterns, ensuring the next generation of plants can grow and reproduce.

3. Ecosystem Relationships: This shows a primary consumer (grasshopper) interacting with a producer (sunflower), demonstrating energy transfer in food webs.

4. Mathematical Patterns in Nature: The sunflower seed arrangement follows Fibonacci spirals, showing how math appears naturally in living things.

Pedagogical Tip:

Use the "See-Think-Wonder" thinking routine with this image. Have students first observe what they see, then think about what's happening, and finally wonder about questions they have. This builds observation skills and scientific curiosity.

UDL Suggestions:

Provide students with magnifying glasses or digital zoom tools to examine details in the image. Offer both verbal descriptions and visual diagrams of grasshopper body parts to support different learning preferences and accessibility needs.

Zoom In / Zoom Out

1. Zoom In: At the cellular level, the grasshopper's compound eyes contain thousands of individual light-detecting cells called ommatidia, each creating a tiny piece of the total image the grasshopper sees, like pixels on a screen.

2. Zoom Out: This interaction is part of a larger prairie or garden ecosystem where grasshoppers serve as both herbivores (eating plants) and prey (food for birds, spiders, and other predators), while sunflowers provide food and habitat for many species.

Discussion Questions

1. How do you think the grasshopper's body parts help it survive in its environment? (Bloom's: Analyze | DOK: 2)

2. What would happen to the sunflower population if all grasshoppers disappeared from this ecosystem? (Bloom's: Evaluate | DOK: 3)

3. What patterns do you notice in how the sunflower seeds are arranged, and why might this pattern be helpful? (Bloom's: Analyze | DOK: 2)

4. How might this grasshopper's feeding behavior affect other organisms in the food web? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: Grasshoppers are harmful pests that only damage plants.
   Reality: While grasshoppers do eat plants, they're important parts of food webs and help with nutrient cycling in ecosystems.

2. Misconception: All insects have the same body parts and functions.
   Reality: Different insects have specialized structures for their specific lifestyles - grasshoppers have jumping legs while butterflies have long tongues for nectar.

3. Misconception: Plants don't interact with animals.
   Reality: Plants and animals have many relationships including pollination, seed dispersal, and providing food and shelter.

Cross-Curricular Ideas

1. Math - Fibonacci Sequences and Spirals: Have students investigate the mathematical patterns in sunflower seed arrangements by creating their own Fibonacci spirals using graph paper or digital tools. They can measure and calculate the angles between seed clusters to discover how nature uses math for efficiency. This connects to patterns, geometry, and number sequences.

2. ELA - Descriptive Writing and Poetry: Students can write detailed descriptive paragraphs or haikus about the grasshopper and sunflower interaction, using sensory language (what they see, hear, feel). They could also research and write informational reports about grasshopper life cycles or create a short story from the grasshopper's perspective as it navigates its environment.

3. Art - Nature Sketching and Mixed Media: Students can create detailed observational drawings of the grasshopper and sunflower using colored pencils or watercolors, focusing on accuracy and detail. They could also create a mixed-media collage showing different organisms in a food web or use natural materials (seeds, dried flowers, leaves) to recreate the sunflower spiral pattern.

4. Social Studies - Agricultural Impacts and Farming: Connect to how grasshoppers affect farming and agriculture. Students can research the history of sunflowers (native to North America), learn about sustainable farming practices that balance crop production with ecosystem health, and explore how farmers manage grasshopper populations without harming the environment.

STEM Career Connection

1. Entomologist (Insect Scientist): An entomologist is a scientist who studies insects like grasshoppers. They learn about how insects live, what they eat, how they grow, and how they interact with plants and other animals. Some entomologists help farmers protect their crops while keeping insects safe, while others study insects in nature to understand ecosystems better. Average Salary: $63,000-$75,000 per year

2. Botanist (Plant Scientist): A botanist studies plants, including how they grow, reproduce, and survive in different environments. They might study sunflowers specifically to understand how plants make seeds or how to grow better crops. Some botanists work in gardens, farms, or laboratories discovering new ways to help plants thrive. Average Salary: $62,000-$78,000 per year

3. Ecologist (Ecosystem Scientist): An ecologist studies how all living things in an environment interact with each other, like how grasshoppers eat plants and become food for birds. They work to protect habitats and understand food webs. Ecologists help communities make decisions about protecting nature and managing wildlife. Average Salary: $67,000-$82,000 per year

NGSS Connections

- Performance Expectation: 5-LS2-1 - Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment
- Disciplinary Core Ideas: 5-LS1.A, 5-LS2.A, 3-LS4.B, 1-LS1.A
- Crosscutting Concepts: Structure and Function, Patterns, Systems and System Models

Science Vocabulary

* Compound eyes: Eyes made of many small parts that detect movement and light from different directions.
* Adaptation: A special feature that helps an organism survive in its environment.
* Herbivore: An animal that eats only plants for food.
* Fibonacci spiral: A mathematical pattern found in nature where numbers follow a special sequence.
* Ecosystem: All the living and non-living things in an area that interact with each other.
* Primary consumer: An organism that eats plants and is the first level of consumers in a food chain.

External Resources

Children's Books:
- The Magic School Bus Hops Home: A Book About Animal Habitats by Joanna Cole
- Grasshoppers by Gail Gibbons
- From Seed to Sunflower by Wendy Pfeffer