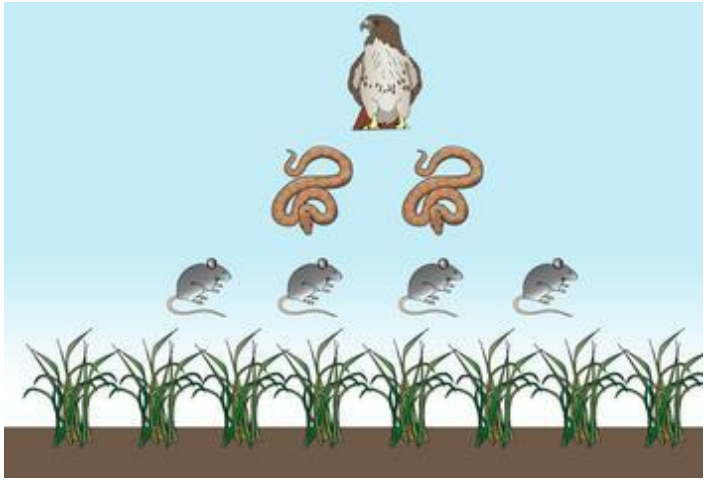
9 Week Unit

UNIT 2

MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS



Fifth Grade | Rogers Public Schools

Unit 2: Matter and Energy in Organisms and Ecosystems 9 weeks

In this unit, students develop the understanding that plants and animals get the materials they need for growth and life from the air, water, and their surrounding environment. Students will use models to describe how energy in animals' food was once energy from the sun. Animals use this energy from food for body repair, growth, motion, and to maintain their body temperature. Students will construct explanations and support arguments that plants get the materials they need for growth chiefly from the air and water. Plants need sufficient amounts of air, water, nutrients and light to survive. Many plants have roots that absorb their nutrients and water from the soil. Plants also have stems to move water and nutrients throughout the plant and leaves to make the food it needs to survive. Students will understand how the chemical process of photosynthesis helps plants meet their basic needs. This process uses light energy from the sun, water and nutrients absorbed form the ground, and carbon dioxide absorbed from the air.

Students will also understand how energy is changes and transferred in an ecosystem. Living things use chemical energy by changing it into motion and heat energy. Plants in living systems collect energy from the sun. Students will understand that when living organisms feed on and absorb the energy stored in another organism, that energy is transferred from one organism to another up the food web. Each time energy moves to different organisms, that organism gains some of the energy that the original organism had. Some organisms, such as fungi and bacteria, break down dead organisms, both plants or plant parts and animals). These organisms operate as decomposers. Decomposition eventually restores materials back into the soil.

Students will understand what an ecosystem is and will be able to identify characteristics of healthy ecosystems and understand the interdependent relationships in ecosystems. An ecosystem includes the living and non-living things in an environment. An ecosystem also includes the interactions between these things. In a healthy ecosystem, the interactions are balanced so that the ecosystem continues to survive. Students will understand that each organism has its own place in the ecosystem but is also dependent on other organisms within the system. Organisms can only survive in environments in which their needs are met. Students will also understand that if an ecosystem becomes unbalanced, it will not be able to continue to survive. Students will apply these understanding to craft models that describe the movement of matter and energy within an ecosystem.

Unit 2 Performance Expectations

- **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.

- **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-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.

In Unit 2, students will understand…

- Energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter.
- Food provides animals with the materials they need for body repair and growth.
- Food provides animals with the energy they need to maintain body warmth and for motion.
- Plants acquire their material for growth chiefly from air and water.
- The food in 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 and therefore operate as decomposers.
- Decomposition eventually restores (recycles) some materials back to 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.
- 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.

Unit 2 Essential Questions:

- How do organisms obtain and use the matter and energy they need to live and grow?
- How are matter and energy moved/transferred through an ecosystem?
- How do organisms interact with their environment?

Foundational Knowledge:

Prior to 5th grade, students should have knowledge, understanding of, and experiences with the following ideas:

- When two objects rub against each other, this interaction is called friction.
- Friction between two surfaces can warm both of them (i.e.: rubbing hands together).
- There are ways to reduce the friction between two objects.
- All animals need food in order to live and grow.
- Animals depend on and obtain their food from plants or other animals.
- Animals depend on their surroundings to get what they need, including food, water, shelter, and favorable temperature.
- Animals use their senses to find food and water, and they use their body parts to gather, catch, eat, and chew the food.
- Plants depend on air, water, minerals (in the soil), and light to grow.
- Animals can move, but plants cannot, and they often depend on animals for pollination or to move their seeds around.
- Different plants survive better in different settings because they have varied needs for water, minerals, and sunlight.
- Organisms obtain the materials they need to grow and survive from the environment.
- Many of these materials come from organisms and are used again by other organisms.

With the implementation of new standards, students may not have had opportunities to engage in these foundational understandings and ideas before 5th grade. You may need to provide opportunities for students to experience these ideas as you move forward.

Additional Content Connections:

*These connections provide opportunities to score to other content standards with focused instruction.

ELA:

- Speaking and Listening
  - SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
  - SL.5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
  - SL.5.3 Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
- Writing
  - W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

Unit Vocabulary:

energy	consumers	organisms
transfer	producers	ecosystems
photosynthesis	decomposers	food web
plants	species	environment
animals		

Matter and Energy in Organisms and Ecosystems

Students who demonstrate understanding can:

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.]

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-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.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*.

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Use models to describe phenomena. (5-PS3-1)
- Develop a model to describe phenomena. (5-LS2-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model. (5-LS1-1)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science explanations describe the mechanisms for natural events. (5-LS2-1)

Disciplinary Core Ideas

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). (5-PS3-1)

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 for motion. (secondary to 5-PS3-1)
- Plants acquire their material for growth chiefly from air and water. (5-LS1-1)

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 plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to 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. (5-LS2-1)

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. (5-LS2-1)

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-LS2-1)

Energy and Matter

- Matter is transported into, out of, and within systems. (5-LS1-1)
  Energy can be transferred in various ways and between objects. (5-PS3-1)