5th Grade Unit 2 - Matter and Energy in Ecosystems

Content Area: **Science**
Course(s): **Science Grade 5**
Time Period: **MP2**
Length: **45 days**
Status: **Published**

NJSLS - Science

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.
5-LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water.
5-LS2-1	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Science and Engineering Practices

Developing and Using Models

Develop a model using an example to describe a scientific principle. (5-ESS2-1)

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

Engaging in Argument from Evidence

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

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with

the landforms to determine patterns of weather. (5-ESS2-1)

LS1.C: Organization for Matter and Energy Flow in Organisms

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)

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)

Crosscutting Concepts

Systems and System Models

A system can be described in terms of its components and their interactions. (5-ESS2-1, 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)

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

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

Rationale and Transfer Goals

In this unit of study, students develop an understanding of the idea that living things get the materials they need for growth chiefly from air, nutrients, and water. Using models, students can describe 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. The crosscutting concepts of energy and matter and systems and system models are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in developing and using models and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.

In this unit of study, students are able to describe ways in which the geosphere, biosphere, hydrosphere, and atmosphere interact.

Enduring Understandings

Understand that Earth has four major interacting systems called: geosphere, hydrosphere, atmosphere, and biosphere.

Plants acquire their material for growth chiefly from air and water.

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.

The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter.

Essential Questions

In what ways do the geosphere, biosphere, hydrosphere, and atmosphere interact?

Where do plants get the materials they need for growth?

How does matter cycle between the living and nonliving parts of an ecosystem?

How can energy in animals' food be traced to the sun?

Content - What will students know?

- A system can be described in terms of its components and their interactions.
- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans).
- The Earth's major systems interact in multiple ways to affect Earth's surface materials and processes.
- The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate.
- Winds and clouds in the atmosphere interact with landforms to determine patterns of weather.
- Matter is transported into, out of, and within systems.
- Plants acquire their material for growth chiefly from air and water.
- Science explanations describe the mechanisms for natural events.
- 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.
- Energy can be transferred in various ways and between objects.
- The energy released from food was once energy from the sun, which was captured by plants in the chemical process that forms plant matter (from air and water).
- Food provides animals with the materials they need for body repair and growth and the energy they need for motion and to maintain body warmth.

Skills - What will students be able to do?

- Describe a system in terms of its components and interactions.
- Develop a model using an example to describe a scientific principle.
- Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (The geosphere, hydrosphere, atmosphere, and biosphere are each a system. Assessment is limited to the interactions of two systems at a time.)
- Describe how matter is transported into, out of, and within systems.
- Support an argument with evidence, data, or a model.
- Support an argument that plants get the materials they need for growth chiefly from air and water. (Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.)
- Develop a model to describe phenomena.
- Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (Assessment does not include molecular explanations.)
- Emphasis is on the idea that matter that is not food—such as air, water, decomposed materials in soil—is changed into matter that is food. Examples of systems could include: Organisms, Ecosystems, and Earth.
- Describe how energy can be transferred in various ways and between objects.
- Use models to describe phenomena.
- 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.

Activities - How will we teach the content and skills?

- Inspire Science Grade 5 Unit 2 Matter in Ecosystems Module: Lesson 1 Plant Survival
- Inspire Science Grade 5 Unit 2 Matter in Ecosystems Module: Lesson 2 Interactions of Living Things
- Inspire Science Grade 5 Unit 2 Matter in Ecosystems Module: Lesson 3 Role of Decomposers
- Inspire Science Grade 5 Unit 2 Energy in Ecosystems Module: Lesson 1 Earth's Major Systems
- Inspire Science Grade 5 Unit 2 Energy in Ecosystems Module: Lesson 2 Cycles of Matter in Ecosystems
- Inspire Science Grade 5 Unit 2 Energy in Ecosystems Module: Lesson 3 Energy Transfer in Ecosystems
- 5-ESS2-1 Lesson Examples
- 5-LS1-1 Lesson Examples
- 5-LS2-1 Lesson Examples
- 5-PS3-1 Lesson Examples

Formative Assessments

- Inspire Science Labs
- Inspire Science STEM Module Projects
- Inspire Science Grade 5 Unit 2 Matter in Ecosystems Module: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 2 Matter in Ecosystems Module: Lesson 2 Lesson Check
- Inspire Science Grade 5 Unit 2 Matter in Ecosystems Module: Lesson 3 Lesson Check
- Inspire Science Grade 5 Unit 2 Energy in Ecosystems Module: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 2 Energy in Ecosystems Module: Lesson 2 Lesson Check
- Inspire Science Grade 5 Unit 2 Energy in Ecosystems Module: Lesson 3 Lesson Check
- Daily Warm Ups
- Daily Exit Tickets

- Science Journal

Summative Assessments

- Inspire Science STEM Module Projects
- Tests/Quizzes
- Grade 5 Unit 2 Benchmark Assessment

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
• Plants acquire their material for growth chiefly from air and water. • The food of almost any kind of animal can be traced back to plants.	Kindergarten: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. Grade 2: Plants depend on water and light to grow. Grade 2: Plants depend on animals for pollination or to move their seeds around. Grade 4: Living things affect the physical characteristics of their regions.	K-LS1-1 Activities 2-LS2-1 Activities 2-LS2-2 Activities

Key Resources

Bottle Terrarium

Biodomes Engineering Project

Brainpop Photosynthesis

Bill Nye Food Web Video

Food chain game

Food Chain Activity- lesson to teach food chains

Food Chain Websites

Inspire Science

Career Readiness, Life Literacies, & Key Skills

9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).
9.2.5.CAP.1	Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
9.1.5.CR.1	Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
9.4.5.CI.2	Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).
9.4.5.DC.8	Propose ways local and global communities can engage digitally to participate in and promote climate action (e.g., 6.3.5.GeoHE.1).
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.
9.4.5.TL.2	Sort and filter data in a spreadsheet to analyze findings.
9.4.5.TL.3	Format a document using a word processing application to enhance text, change page formatting, and include appropriate images graphics, or symbols.

Interdisciplinary Connections

NJSLS ELA

RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections when drawing inferences from the text. (5-LS1-1)

RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears. (5-ESS2-1, 5-LS2-1, 5-PS3-1)

RI.CT.5.8. Compare and contrast the authors' approaches across two or more informational texts within the same genre or about texts on the same or similar topics. (5-LS1-1)

W.AW.5.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5- LS1-1)

A. Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.

B. Provide logically ordered reasons that are supported by facts and details from text(s), quote directly from text when appropriate.

C. Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).

D. Provide a conclusion related to the opinion presented.

SL.UM.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1, 5-LS2-1, 5-PS3-1)

NJSLS Mathematics

MP.2 Reason abstractly and quantitatively. (5-ESS2-1, 5-LS1-1, 5-LS2-1)

MP.4 Model with mathematics. (5-ESS2-1, 5-LS1-1, 5-LS2-1)

MP.5 Use appropriate tools strategically. (5-LS1-1)

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS2-1)

5.M.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5-LS1- 1)