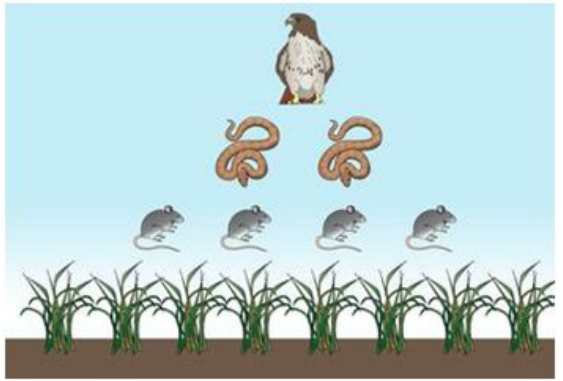
5th Grade Unit 2
9 weeks

Matter and Energy in Organisms and Ecosystems



Unit Planning Team:
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Kasey Benson (OW), Jenny Humble (GH)

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?

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)

Matter and Energy in Organisms and Ecosystems

Background knowledge videos:

PS3D - Energy in Chemical Processes & Life

LS1C - Organization in Organisms

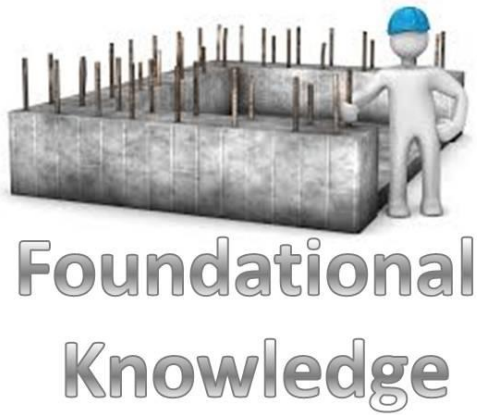
LS2A - Relationships in Ecosystems

LS2B - Cycles in Ecosystems

These videos are designed to assist in providing background knowledge with the associated DCI. The information in the videos follows the progression through high school.

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

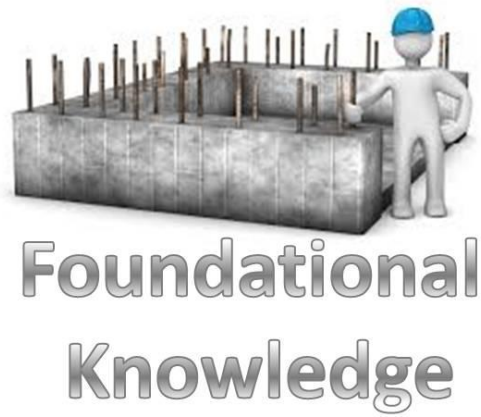
- ★ When two objects rub against each other, this interaction is called friction.
- ★ Friction between two surfaces can warm both of them (i.e.: rubbing hands together).
- ★ There are ways to reduce the friction between two objects.
- ★ All animals need food in order to live and grow.
- ★ Animals depend 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.



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.

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

- ★ 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.

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?

Big Ideas

- ★ 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.

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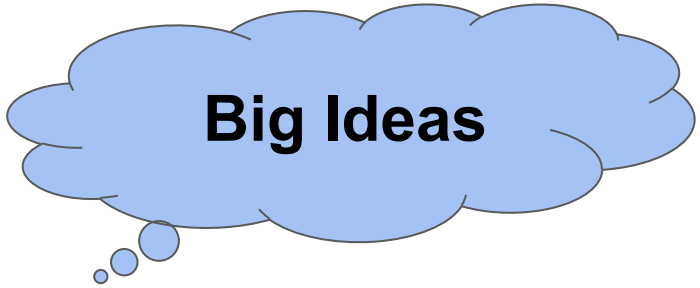

- ★ Organisms can survive only in environments in which their particular needs are met.
- ★ A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.
- ★ Newly introduced species can damage the balance of an ecosystem.
- ★ 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.

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 flowcharts.

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)

Clarifications:

Models: include drawings, diagrams, pictures, computer simulations, and physical models.

Misconception: Some energy on Earth comes from the sun, but some energy comes from fossil fuels. Even the energy in fossil fuels comes from the sun. Millions of years ago, living things changed energy from the sun into chemical energy. The remains of these living things turned into fossil fuels. When we burn coal or oil, we release this energy.

Misconception: All animals that live in the ocean breathe water.

All animals need oxygen to stay alive, but not all animals breathe air. Animals that live in the ocean need oxygen, just as animals on land do. Some animals that live in water, such as dolphins and turtles, come to the surface to breathe air. Other animals, such as fish, have special body parts that pull oxygen out of the water. They still need oxygen to live.

Identify and CLARIFY the STANDARDS

Matter and Energy in Organisms and Ecosystems

Students who demonstrate understanding can:

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.

Disciplinary Core Ideas

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

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

Clarifications:

Misconception: Some students may not think of moving air as having energy. They may question where the energy in wind comes from. This is complex because the answer involves both the sun and the motion of Earth. But the quick answer for now is that it also comes from the sun, which warms the air more in one place than others, causing the air to move.

Misconception: Students may think that plants need oxygen when, in fact, they need carbon dioxide and produce oxygen. They may also think that plants require soil; while many plants do need soil for sustained growth, some do not. Additionally, some students, thinking of syrup coming from the sap of trees, may mistakenly believe that plants need sugar.

Identify and CLARIFY the STANDARDS

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Matter and Energy in Organisms and Ecosystems

Students who demonstrate understanding can:

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.

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Models: include drawings, diagrams, pictures, computer simulations, and physical models.

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

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LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

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Discovery Education
Science Techbook Units

Gather and study the RESOURCES

Week	Performance Expectation & 5E Engage, Explore, Explain, Elaborate, Evaluate	Notes/Additional Resourcs
1	**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 throughout an ecosystem? • How do organisms interact with their environment? **Foundational Knowledge** DE Food and Oxygen Background knowledge	Jigsaw Reading Activity from Food and Oxygen PowerPoint: DE - Unit Page - 5 minute prep section (on right side) Spotlight on Strategies: Tweet, Tweet Description of Strategy (SL.5.1, SL.5.2, SL.5.3, W.5.9) Tweet, Tweet on DE *NOTE: DE Spotlight on Strategies page has simple instructional strategies incorporate digital media in meaningful, effective, and practical ways.* Science Writing Sentence Frames and Words Crash Course For Kids (Youtube)

DE - Discovery Education Techbook Resource

Week	Performance Expectation & 5E Engage, Explore, Explain, Elaborate, Evaluate	Notes/Additional Resources
2-3	**Food and Oxygen** Engage: DE Food and Oxygen "Engage" tab Explore: DE Interactive with student guide Explain: DE Explaining Food and Oxygen Elaborate: Oh Deer! Game Evaluate: DE Constructed Response	Mystery Science: Why would a hawk move to the city? *(Requires an account. You can sign up for a free year.)* Build a Food Web activity It's a Plankton-eat-plankton World activity Marine Food Web Game What if There Were No... *(Book series by Suzanne Slade- Available at the public library)* See her books

Week	Performance Expectation & 5E Engage, Explore, Explain, Elaborate, Evaluate	Notes/Additional Resources
4-5	**Basic Needs of Plants** DE Model Lesson - Teacher Overview Student Background Knowledge Ideas and resources about how to fill learning gaps prior to this lesson if needed **Engage:** Session 1 Activate Prior Knowledge and Stimulate Interest **Explore:** Session 2 Directed Inquiry Session 3 Interactive Glossary Session 4 and 5 Core Interactive Text and Additional Resources **Explain:** Session 6 and 7 Scientific Explanation **Elaborate:** Session 8 and 9 Virtual Lab (STEM Project) **Evaluate:** Review and Assessment Constructed Responses	The following assessment probes can be used and are found at Assessment Probes for 5th Grade WebPage *-intranet password protected* Which Will Dry out Last? Chlorophyll Light and Dark Food for Corn The Hidden Colors of Autumn – 5E's Lesson Plan

Week	Performance Expectation & 5E Engage, Explore, Explain, Elaborate, Evaluate	Notes/Additional Resources
6-7	**Parts of Ecosystems** DE Model Lesson Student Background Knowledge Ideas and resources about how to fill learning gaps prior to this lesson if needed **Engage:** Session 1 Activate Prior Knowledge and Stimulate Interest **Explore:** Session 2 and 3 Directed Inquiry and Core Interactive Text Session 5 and 6 Directed Inquiry, Core Interactive Text and Additional Materials, hands on activity **Explain:**Session 4 Scientific Explanation and Video Segment **Elaborate:** Session 7 Scientific Explanation and Video Segments Session 8 Video Segments and Optional Project 1 **Evaluate:**Session 9 Video Quiz and Constructed Response Connect to learning at ONSC www.onsc.us ONSC Live! videos	The following assessment probes can be used and are found at Assessment Probes for 5th Grade WebPage *-intranet password protected* Ecosystem Cycles No more Plants Is it Living? (Biotic vs. Abiotic) No Water off a Duck's Back

Week	Performance Expectation & 5E Engage, Explore, Explain, Elaborate, Evaluate	Notes/Additional Resources
8-9	**Energy of Systems** DE Model Lesson Student Background Knowledge **Engage:** Session 1 Activate Prior Knowledge and Stimulate Interest **Explore:** Session 2 Directed Inquiry Session 3 Interactive Glossary Session 4-5 Core Interactive Text and Additional Resources **Explain:** Session 6-7 Scientific Explanation **Elaborate:** Session 8-9 Investigation (STEM) Session 10-11 Projects **Evaluate**: Session 12 Constructed Responses and board builder Unit Review Unit Assessment **Assessment Option:** Create a paper slide show to answer the 3 essential questions. DE Strategy - Paper Slides **Extension Project:** (could be used to re-visit concepts prior to or after your trip to ONSC) ONSC Project PPT PDF	Other resources: Energy Conversion (Gizmo) Consider dissecting owl pellets to show how energy is transferred from one organism to another

Plan
DAILY
LESSONS

Incorporate
TECHNOLOGY

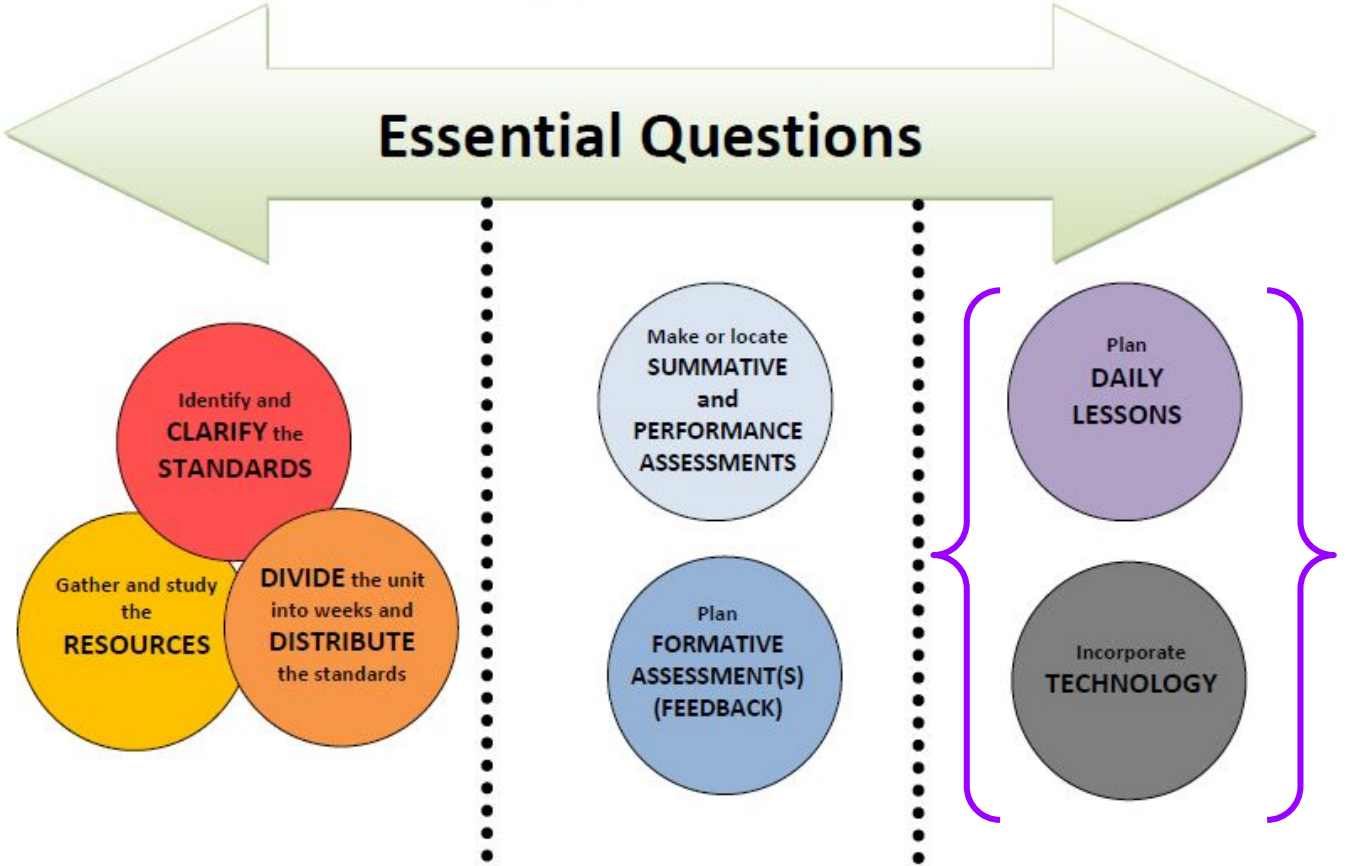
Additional Resources:

Uncovering Student Ideas in Science Assessment probes

*any assessment probes mentioned in plan are available on our website

Assessment Probes for 5th Grade WebPage *-intranet password protected*

Backward Unit Planning 1.0



Now you're ready to plan your daily lessons!