Matter and Energy in Organisms and Ecosystems

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

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?

★ 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.
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.
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.
Clarifications:

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

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.
<table>
<thead>
<tr>
<th>Week</th>
<th>Performance Expectation &amp; 5E</th>
<th>Notes/Additional Resources</th>
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</table>
| 1    | Engage, Explore, Explain, Elaborate, Evaluate | 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) |

**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
<table>
<thead>
<tr>
<th>Week</th>
<th>Performance Expectation &amp; 5E</th>
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<tbody>
<tr>
<td>2-3</td>
<td>Engage, Explore, Explain, Elaborate, Evaluate</td>
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<td></td>
<td><strong>Food and Oxygen</strong></td>
<td><strong>Mystery Science: Why would a hawk move to the city?</strong> <em>(Requires an account. You can sign up for a free year.)</em></td>
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<tr>
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<td>Engage: DE Food and Oxygen “Engage” tab</td>
<td>Build a Food Web activity</td>
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<td>Explore: DE Interactive with student guide</td>
<td>It’s a Plankton-eat-plankton World activity</td>
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<td>Explain: DE Explaining Food and Oxygen</td>
<td>Marine Food Web Game</td>
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<td>Elaborate: Oh Deer! Game</td>
<td>What if There Were No... <em>(Book series by Suzanne Slade- Available at the public library)</em> See her books</td>
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<td>Evaluate: DE Constructed Response</td>
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<td>Week</td>
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<td>4-5</td>
<td><strong>Basic Needs of Plants</strong></td>
<td>The following assessment probes can be used and are found at <a href="#">Assessment Probes for 5th Grade WebPage</a> - intranet password protected</td>
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<tr>
<td></td>
<td><strong>DE Model Lesson</strong> - Teacher Overview</td>
<td>Which Will Dry out Last? Chlorophyll Light and Dark Food for Corn</td>
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<td><strong>Student Background Knowledge</strong> Ideas and resources about how to fill learning gaps prior to this lesson if needed</td>
<td>The Hidden Colors of Autumn – 5E’s Lesson Plan</td>
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<td><strong>Engage:</strong></td>
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<td><strong>Session 1</strong>  Activate Prior Knowledge and Stimulate Interest</td>
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<td><strong>Explore:</strong></td>
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<td><strong>Session 2</strong>  Directed Inquiry</td>
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<td><strong>Session 3</strong>  Interactive Glossary</td>
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<td><strong>Session 4 and 5</strong>  Core Interactive Text and Additional Resources</td>
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<td><strong>Explain:</strong></td>
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<td><strong>Session 6 and 7</strong>  Scientific Explanation</td>
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<td><strong>Elaborate:</strong></td>
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<td><strong>Session 8 and 9</strong>  Virtual Lab (STEM Project)</td>
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<td><strong>Evaluate:</strong></td>
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<td><strong>Review</strong> and  <strong>Assessment</strong>  Constructed Responses</td>
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<td>Engage, Explore, Explain,</td>
<td>The following assessment probes can be used and are found at <a href="http://www.onsc.us/ONSC_Live">Assessment Probes for 5th Grade WebPage</a> - intranet password protected</td>
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<tr>
<td></td>
<td>Elaborate, Evaluate</td>
<td>Ecosystem Cycles</td>
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<td></td>
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<td>No more Plants</td>
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<td>Is it Living? (Biotic vs.</td>
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<td>Abiotic)</td>
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**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](http://www.onsc.us/ONSC_Live) Activate Prior Knowledge and Stimulate Interest

**Explore:**

- [Session 2 and 3](http://www.onsc.us/ONSC_Live) Directed Inquiry and Core Interactive Text
- [Session 5 and 6](http://www.onsc.us/ONSC_Live) Directed Inquiry, Core Interactive Text and Additional Materials, hands on activity

**Explain:** [Session 4](http://www.onsc.us/ONSC_Live) Scientific Explanation and Video Segment

**Elaborate:**

- [Session 7](http://www.onsc.us/ONSC_Live) Scientific Explanation and Video Segments
- [Session 8](http://www.onsc.us/ONSC_Live) Video Segments and Optional Project 1

**Evaluate:** [Session 9](http://www.onsc.us/ONSC_Live) Video Quiz and Constructed Response

Connect to learning at ONSC

[www.onsc.us](http://www.onsc.us) [ONSC Live](http://www.onsc.us) videos
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<tr>
<td>8-9</td>
<td>Engage, Explore, Explain, Elaborate, Evaluate</td>
<td>Other resources: Energy Conversion (Gizmo)</td>
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### 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:
Consider dissecting [owl pellets](#) to show how energy is transferred from one organism to another
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

Essential Questions

Identify and CLARIFY the STANDARDS

Gather and study the RESOURCES

DIVIDE the unit into weeks and DISTRIBUTE the standards

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

Plan FORMATIVE ASSESSMENT(S) (FEEDBACK)

Plan DAILY LESSONS

Incorporate TECHNOLOGY

Now you’re ready to plan your daily lessons!