Englewood Public School District
Science
Grade 5
Second Marking Period

Unit 3: Energy and Matter in Ecosystems

Overview: In this unit of study, students develop an understanding of the idea that plants get the materials they need for growth chiefly from air 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. This unit is based on 5-LS1-1, 5-LS2-1, and 5-PS3-1.

Time Frame: 15 days

Enduring Understandings:
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, 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.

Essential Questions:
Where do plants get the materials they need for growth?
How does matter move among plants, animals, decomposers, and the environment?
How can energy in animals' food be traced to the sun?

Standards	Topics and Objectives	Activities	Resources	Assessments
(5-LS1-1): Support an argument that plants get the materials they need for growth chiefly	**Topics** Energy and Matter in Ecosystems Twenty-First Century Themes	Students will discuss how the information and skills they are learning have application to everyday life, including future careers. (9.2.8.B.3)	Bottle Biology Terrarium: Materials for building the bottle container: • Recycled clear plastic bottle • Small or large (16 – 24 oz.) • Marking pen • Shoe box or straight edge	**Formative Assessment:** Do Now/Ticket to Leave Journals

from air and water. **(5-LS2-1): Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** **(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.**	and Skills include: • The Four C's • Environmental Literacy • Global Awareness **Objectives** **Bottle Biology Terrarium:** Students will be able to identify some of the living creatures that help decompose organic materials after creating create a habitat for a living creature. **Bio domes Engineering:** Students will define a bio dome and name its important features and will use the engineering design process to create a model bio dome of a particular environment. **What is an Ecosystem?** Students will explain the meaning of an ecosystem. **Wetlands are Wonderlands:** Students will understand and	**Bottle Biology Terrarium**: Students will gain an understanding of creating a model terrestrial habitat from the ground up. (8.2.5.A.3) **Biodome Engineering:** In this multi-day activity, students explore environments, ecosystems, energy flow and organism interactions by creating a scale model biodome, following the steps of the engineering design process. (5-PS3-1, 5.MD.1, MP.4, MP.5, RI.5.7) **What is an Ecosystem?** In this lesson, students will research several sources to answer the question, "What is an ecosystem?" At the end of today's lesson, students will compile their research in a class idea web. (5-LS1-1, MP.2, RI.5.1, RI.5.9, CRP4, CRP8) **Wetlands are Wonderlands:** Students will complete a multi-part investigation that explores the movement of energy in a wetland environment. (5-LS2-1, W.5.1, SL.5.5)	• Scissors • Strong string or twine – about 3 feet • Sharp pin • Paper hole punch Materials for building a terrarium • Spoon • 50 cc of gravel • 50 cc of sand • 100 cc of soil • Water • Plant material • Moistened leaves and twigs • Critters of interest: sow • Bugs, slugs, worms, etc. Biodome Engineering: Materials for each group: • Biodome Engineering Design Project Workbook: Lessons 2-6 • 2 plastic containers (1- and 2-liter bottles with lids work well, or other inexpensive clear plastic trays, bowls, covers and lids) Well in advance, ask students to bring biodome construction materials from home, or rinse out plastic containers from a recycling bin. • Seeds (provide several types for different climates) • Soil (3-4 cups or .7-.9 l) • Sand (3-4 cups or .7-.9 l) • Supply of miscellaneous materials, such as pebbles, rocks, wire, small paper cups, plastic wrap, string, foil, popsicle sticks, chopsticks, etc. • If insects are not available outside (due to the weather or other limitations), consider purchasing a small supply of crickets from a pet store. Class Materials: • Masking tape • Duct tape • Glue (preferred: hot glue sticks with glue guns) • Scissors • Exacto knives (if teacher cuts the plastic bottles) • Butterfly nets and/or jars and paper cups (to catch and	**Bottle Biology Terrarium:** Student diagrams **Ecosystem:** Organizer **Benchmark Assessment:** Exact Path **Summative Assessment:** **Bottle Biology Terrarium:** Student terrariums **Biodome Engineering:** Engineering Poster **Ecosystem:** Organizer **Wetlands are Wonderlands:** Food Webs Wolf Island Paragraph 3D Food Web Energy Pyramid

	demonstrate how energy moves through an ecosystem.	hold insects and worms) • Drill (to make a hole in plastic bottle lids) • Water Wetlands are Wonderful: Day 1: • Copy a class set of the Thinksheet and Family Page. (See Ready to Print for a complete listing of printable pages.) • Bookmark the Wetlands Are Wonderlands! Online Wetland Ecosystem on the computers you will use. • Review Related Resources and select resources. Day 2: • Load the Wetlands Are Wonderlands! Online Wetland Ecosystem on your classroom computer(s) so that teams of students can refer to it as needed. • Gather a sheet of large construction paper or chart paper (12x18 or larger) for each team of four to six students. • Gather markers or crayons for each team if students do not have their own. Day 3: • Locate a copy of *Wolf Island* by Celia Godkin (see Related Resources). • Copy a class set of the Wetlands Are Wonderlands and Wolf Island pages Day 4: • Copy a class set of the • Gather scissors and tape. • Make a sample 3D Model prior to the lesson for display. • Choose a student food web poster from Day 2 to use during the lesson. Day 5: • Gather the following student materials: glue sticks (or glue), scissors, yellow and red crayons or coloring pencils. • Copy a class set of the Energy Flows and Matter Cycles Pyramid of Energy and The Pyramid of Energy and Food Webs and make an overhead transparency of these pages for teacher use. • Gather the following teacher materials: red and yellow overhead markers. **<u>Additional Resources:</u>** 3D Model and Student Information Pages. <u>https://www.neok12.com/Ecosystems.htm</u>	**Alternative Assessments:** Students will support an argument with evidence, data, or a model. Checklists, chart, rubric, written performances Students will describe how energy can be transferred in various ways and between objects. Essays, Entry/Exit tickets Students will use models to describe phenomena. Diagrams, Flowcharts Students should use information from print and digital sources to build their understanding of energy and matter in ecosystems.

		http://www.watchknowlearn.org/Video.aspx?VideoID=30948&CategoryID=2309 https://www.epa.gov/wetlands/wetlands-education-students-and-teachers https://defenders.org/wetlands/basic-facts **Books:** https://www.goodreads.com/shelf/show/ecosystem https://www.storyjumper.com/book/index/8733412/ECOSYSTEMS https://www.amightygirl.com/mighty-girl-picks/top-children-s-books-on-the-environment http://www.amazon.com/The-World-Terrariums-Charles-Wilson/dp/0824601947 Wetland Ecosystems	Computers, checklists, Pre/post tests Students will use appropriate tools in strategic ways when making and recording observations of the living and nonliving components of an ecosystem. Graphs, tables, charts, essay

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity In planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
• Ask student to repeat back directions • Speak and display terminology • Teacher modeling • Peer modeling • Provide ELL students with multiple literacy strategies. • Word walls • Use peer readers • Give page numbers to help the students find answers • Provide a computer for written work • Provide two sets of textbooks, one for home and one for school • Provide visual aides • Provide additional time to complete a task • Use graphic organizers	• Teachers may modify instructions by modeling what the student is expected to do • Utilize modifications & accommodations delineated in the student's IEP • Work with paraprofessional • Use multi-sensory teaching approaches. • Work with a partner • Provide concrete examples • Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	• Teachers may modify instructions by modeling what the student is expected to do • Using visual demonstrations, illustrations, and models • Give directions/instructions verbally and in simple written format. Oral prompts can be given. • Peer Support • Increase one on one time • Instructions may be printed out in large print and hung up for the student to see during the time of the lesson. • Review behavior expectations and make adjustments for personal space or other behaviors as needed. • Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).	• Curriculum compacting • Inquiry-based instruction • Independent study • Higher order thinking skills • Adjusting the pace of lessons • Interest based content • Real world scenarios • Student Driven Instruction • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understand -ings. • Use project-based science learning to connect science with observable phenomena. • Structure the learning around explaining or solving a social or community-based issue. • Collaborate with after-school programs or clubs to extend learning opportunities.
Interdisciplinary Connections:			

ELA-NJSLS/ELA:
RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1)
RI.5.7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-LS2-1), (5-PS3-1)
RI.5.9: Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)
W.5.1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)
SL.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-LS2-1), (5-PS3-1)

Mathematics:
MP.2: Reason abstractly and quantitatively. (5-LS1-1), (5-LS2-1)
MP.4: Model with mathematics. (5-LS1-1), (5-LS2-1)
MP.5: Use appropriate tools strategically. (5-LS1-1) MP.5
5.MD.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)

Career Ready Practices:
CRP4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of 21st Century Skills:
9.2.8.B.3
Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Integration of Technology Standards NJSLS 8:
8.2.5.A.3 : Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.

Key Vocabulary:
Consumer: An organism that eats other organisms.
Decomposer: An organism that consumes parts of dead organisms and transfers all the biomass into simple chemicals.
Ecosystem: A system of interacting organisms and nonliving factors in a specified area.
Food chain: A sequence of organisms that eat one another in an ecosystem.
Food web: All the feeding relationships in an ecosystem.
Herbivore: An organism that eats only plants.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Engaging in Argument from Evidence

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

Developing and Using Models

- Develop a model to describe phenomena. (5-S2-1)
- Use models to describe phenomena. (5-PS3-1)

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)

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)

Systems and System Models

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

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Connections to the Nature of Science

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

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

	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)	