Englewood Public School District
Science
Grade 7
Third Marking Period

Unit 6: Matter and Energy in Organisms and Ecosystems

Overview: Students *analyze and interpret data, develop models, construct arguments*, and demonstrate a deeper understanding of the cycling of matter, the flow of energy, and resources in ecosystems. They are able to study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on populations. They also understand that the limits of resources influence the growth of organisms and populations, which may result in competition for those limited resources. The crosscutting concepts of *matter and energy*, *systems and system models*, *patterns*, and *cause and effect* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade-appropriate proficiency in analyzing and interpret data, developing models, and constructing arguments. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Time Frame: 40 to 45 Days

Enduring Understandings:
Organisms and populations of organisms are dependent on their environmental interactions with other living and nonliving things.
Food webs are models that demonstrate how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.

Essential Questions:
How and why do organisms interact with their environment and what are the effects of these interactions?
How do changes in the availability of matter and energy effect populations in an ecosystem?
How do relationships among organisms, in an ecosystem, effect populations?
How can you explain the stability of an ecosystem by tracing the flow of matter and energy?

Standards	Topics and Objectives	Activities	Resources	Assessments
(MS-LS2-1) **Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** **(MS-LS2-2)** **Construct an explanation**	**Topics** Biotic and Abiotic Factors Populations and Communities Relationships in Ecosystems Food Webs Biomes	Students will complete the text activities: 1. Activity - With or Without Salt? 2. Lab - A World in a Jar 3. Discover Activity - What's the population of Beans in a Jar? 4. Lab - Counting Turtles 5. Discover Activity - How well can you hide a	**Text:** Prentice Hall Science Explorer: Environmental Science **Materials:** For Activity - With or Without Salt? • 4 600mL beakers • Room temperature spring	**Formative Assessments:** • Journals • Learning/Response Logs • Discussions **Summative Assessments:**

that predicts patterns of interactions among organisms across multiple ecosystems.

(MS-LS2-3)
Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Succession

Twenty-First Century Themes and Skills include:

- The Four C's
- Life and Career Skills
- Information and Media literacy
- Global Awareness
- Environmental Literacy

Objectives

Students will:

Use cause-and-effect relationships to predict the effect of resource availability on organisms and populations in natural systems.

Make predictions about the impact within and across ecosystems of competitive, predatory, or mutually beneficial relationships as abiotic (e.g., floods, habitat loss) or biotic (e.g., predation) components change.

Develop a model to describe the cycling of matter and energy among living and nonliving parts of an ecosystem.

butterfly?
6. Activity - Weaving a Food Web
7. Discover Activity – Are You Part of a Cycle?
8. Lab - Biomes in a Miniature
9. Discover Activity - How Much Rain is That?
10. Activity- Desert Survival
11. Discover Activity - What Happened Here?

(MS-LS2-1, WHST.6-8.2)

Student will complete the Human Food Chain/WEB—Role-playing Owl Pellet Lab. (CRP4)

Students will explore the components and processes of ecosystems through Exploring the "Systems" in Ecosystems. (MS-LS2-2)

Students will build their own ecosystem simulation by interacting with the Habitable Planet Population Simulator . (MS-LS2-3, CRP8)

Students will determine the outcome of different populations based on given scenarios in Interactive Interdependence. (WHST.6-8.9, RST.6-8.1)

Students will watch the Symbiosis Video.

Students will watch Dead Stuff: The Secret Ingredient in Our

water
- Non-iodized salt
- Brine shrimp eggs
- Paper

For Lab - A World in a Jar
- Aquarium gravel
- Plastic stirring rod
- Tap water
- 2 guppies
- Large jar with a cover
- Metric ruler
- Dip net
- 2 aquatic plants
- 2 small pond snails
- UL-listed lamp with a 60-watt bulb

For Discover Activity - What's the population of Beans in a Jar?
- Plastic jar
- Beans
- Ruler
- Small beaker
- Other size jar

For Lab - Counting turtles
- Model paper turtle population
- Calculator
- Graph paper

For Discover Activity - How well can you hide a butterfly?
- Butterfly outline
- Colored pencils

For Activity - Weaving a Food Web
- Several pieces of yarn
- Index cards

Unit quizzes and test

Students will receive a grade for analysis questions for the following labs: *A World in a Jar, Counting Turtles, Biomes in Miniature,* and *Role Playing Owl Pellet Lab*.

Students will accurately describe predicted populations changes during the Interactive Interdependence activity.
Internet, Computers, Checklist, Rubrics

Students will take a comprehension quiz after viewing Dead Stuff: The Secret Ingredient in Our Food Chain.

Students will accurately research and present information about different biomes.
Research, Projects, Response Journals

Benchmark Assessments:
- Common Formative Assessment
- Exact Path

Alternative Assessments:
Students will develop and use a model to describe how food is rearranged through chemical reactions.
Project/Models, Rubric

Students will construct a

		Food Chain and participate in an online quiz. Biome Jigsaw – Student groups research characteristics, biotic/abiotic factors, populations' relationships and food webs from a biome and present findings to the class. (8.2.8.A.2, 7.SP.C.8, 9.2.8.B.3) **Enrichment Activities:** Students develop food webs and investigate human impacts on marine ecosystems in Modeling Marine Food Webs and Human Impact. (8.2.8.A.5, CRP6, RST.6-8.7) Students compare the Florida Everglades to their local ecosystem in Florida's Everglades: The River of Grass. (7.EE.B.4)	For Discover Activity – Are You Part of a Cycle? • Mirror For Lab - Biomes in a Miniature • Scissors • Index card • Clear plastic wrap • Lamp • 10 impatiens seeds • Tape • 5 lima beans • Stapler • 30 rye grass seeds • Empty, clean cardboard milk carton • Potting soil For Discover Activity - How Much Rain is That? • Meter stick • Adding-machine paper For Activity- Desert Survival • Small cactus plant • Scissors • Hand lens For Discover Activity - What Happened Here? • Textbook • Paper • Pencils **Websites:** • Exploring the "Systems" in Ecosystems • Habitable Planet Population Simulator • Interactive Interdependence **Videos:** • Dead Stuff: The Secret Ingredient in Our Food	scientific explanation for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. Drawing, Oral Presentation, Rubric

		Chain • Symbiosis **Enrichment Lesson Plans:** See Modeling Marine Food Webs and Human Impact: See Florida's Everglades: The River of Grass

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
• Use peer readers • Speak and display terminology • Teacher modeling • Peer modeling • Provide ELL students with multiple literacy strategies.	• Graphic organizers will be provided for note taking • Utilize modifications & accommodations delineated in the student's IEP • Work with	• 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	• Independent study of topics of interest • Curriculum compacting • Inquiry-based instruction • Higher order thinking skills • Adjusting the pace of lessons • Interest based content • Real world scenarios • Student Driven Instruction • Engage students with a

• Word walls • 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	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 • 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).	variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • 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:

RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-1),(MS-LS2-2)

RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1)

WHST.6-8.2: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2)

WHST.6-8.9: Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2)

Mathematics:
7.SP.8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

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.
CRP6: Demonstrate creativity and innovation.

Integration of Technology Standards NJSLS 8:
8.2.8.B.5: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.

Integration of 21st Century Standards NJSLS 9:
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.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1) **Constructing Explanations and Designing Solutions** • Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2) **Developing and Using Models** • Develop a model to describe phenomena.	**LS2.A: Interdependent Relationships in Ecosystems** • Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.	**Patterns** • Patterns can be used to identify cause and effect relationships. (MS-LS2-2) **Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1) **Energy and Matter** • The transfer of energy can be tracked as energy flows through a natural system. (MS-

(MS-LS2-3)	(MS-LS2-1) • Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2) **LS2.B: Cycle of Matter and Energy Transfer in Ecosystems** • Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)	LS2-3) --- ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)