Unit#4: Life Science-Science 7-Populations & Ecosystems

Content Area: **Science**
Course(s): **Science 7**
Time Period: **Fourth Marking Period**
Length: **10 Weeks**
Status: **Published**

Unit Overview

Science is central to the lives of all Americans. Our science education program must prepare our students to be informed citizens and knowledgeable consumers. If the nation is to compete and lead in the global economy and if American students are to be able to pursue expanding employment opportunities in science-related fields, all students in Linden must have a solid K–12 science education that prepares them for college and careers.

The latest standards are based on learning progressions that provide students with opportunities to investigate core ideas in science in increasingly complex ways over time. The target goals for the curriculum are to help students know and use scientific explanations of the natural world and the designed world; to understand the nature and development of scientific knowledge and technological capabilities; and to participate productively in scientific and engineering practices.

STAGE 1- DESIRED RESULTS

2020 New Jersey Student Learning Standards- Science

Life Science

SCI.MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
SCI.MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
SCI.MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
SCI.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.
SCI.MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
SCI.MS-LS1-6	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

SCI.MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Science and Engineering Practices

- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Information
- Using Mathematics and Computational Thinking

Cross Cutting Concepts

- Cause and Effect
- Energy and Matter
- Influence of Engineering, Technology, and Science on Society and the Natural World
- Interdependence of Science, Engineering, and Technology
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Functions
- Systems and System Models

Disciplinary Core Ideas

Physical Sciences

- PS3A: Definitions of Energy
- PS3B: Conservation of Energy and Energy Transfer
- PS3C: Relationship Between Energy and Forces
- PS3D: Energy in Chemical Processes and Everyday Life

Life Sciences

- LS1A: Structure and Functions
- LS1B: Growth and Development of Organisms
- LS1C: Organization for Matter and Energy Flow in Organisms
- LS1D: Information Processing
- LS2A: Interdependent Relationships in Ecosystems
- LS2B: Cycles of Matter and Energy Transfer in Ecosystems
- LS2C: Ecosystems Dynamics, Functioning, and Resilience
- LS2D: Social Interactions and Group Behavior
- LS4A: Evidence of Common Ancestry and Diversity
- LS4B: Natural Selection
- LS4C: Adaptation
- LS4D: Biodiversity and Humans

Earth and Space Sciences

- ESS3A: Natural Resources
- ESS3C: Human Impacts on Earth Systems

Engineering. Technology. and Applications of Science

- ETS1A: Defining and Delimiting an Engineering Problem
- ETS1B: Developing Possible Solutioins
- ETS1C: Optimizing the Design Solution

Essential Questions

Investigation 1: Milkweed Bugs

Part 1. Introducing Milkweed Bugs

How and why do organisms interact with their environment?

What are the effects of those interactions?

What does a population of milkweed bugs need to survive in a classroom?

Part 2. Milkweed-Bug Habitat

What needs to be considered when planning a habitat?

Part 3. Observing Milkweed-Bug Habitats

What observations can we make about the needs of milkweed bugs?

How do milkweed bugs reproduce and grow?

Investigation 2: Sorting out Life

Part 1. Ecosystem Card Sort

What is the relationship between individuals, populations, communities, and abiotic factors in an ecosystem?

What are biotic and abiotic factors within ecosystems?

Part 2. Video Population Study

How does our study of milkweed bugs compare to Jane Goodall's population study?

How did Jane Goodall's presence affect the population of chimps?

Part 3. Ecoscenarios

What are the essential components in an ecosystem?

How do we define an ecosystem?

What are some of the things that we rely on from the ecosystem?

Investigation 3: Mono Lake

Part 1. A Visit to Mono Lake

How and why do organisms interact with their environment?

What are the biotic and abiotic factors of Mono Lake?

What does it mean that Mono Lake is an alkaline lake?

Part 2. Mono Lake Food Web

How do the organisms at Mono Lake interact?

What are some feeding relationships amongst organisms?

What do the arrows indicate about which organism eats another?

Part 3. Ecoscenario Food Webs

How do the organisms in your ecoscenerio interact?

Investigation 4: Minihabitats

Part 1. The Physical Environment

What is a habitat?

What is an aquatic environment mean?

What is a terrestrial environment?

What factors are needed when setting up minihabitats?

Part 2. Introducing Life

What interactions are likely for the organisms in the minihabitats?

Which organisms are predators?

Which organisms are prey?

Part 3. Observing Minihabitats

What changes are taking place in the terrariums and aquariums?

What is happening to the populations?

What upcoming interactions might you predict?

Investigation 5: Producers

Part 1. Growing Producers

What are the items in the bags? (seeds)

Are they living organisms?

What role do they play in an ecosystem?

Part 2. Biomass and Producers

Do seeds have mass?

What do producers need to grow and increase biomass?

What materials do plants need to make food?

What conditions resulted in an increase in boimass?

What is aerobic cellular respiration?

Part 3. What are the roles of specific producers in the ecosystem?

What happens during photosynthesis?

Part 4: How does your body get energy to do what you want to do?

What kind of energy do we get from coal, gas, and wood?

Do you think a snack food will burn?

What materials could we use to measure the temperature?

Investigation 6: Following the Energy

Part 1. What are the kinds of work you do that require energy?

How do you get energy?

Is water a food source?

What do people use for energy?

Part 2. What is needed to sustain a food chain?

What is the difference between a food chain and a food web?

What is being transferred in a food chain?

What is the role of specific organisms in this food chain game?

Part 3. What is food?

Where does food come from?

Do different organisms need different amounts of energy?

Part 4: Decomposers;

What happened to the food that we added to the terrariums?

Does every bit of biomass get eaten?

What happens to organisms that do not get eaten?

Investigation 7: Population Size

Part 1: Do you have a population of milkweed bugs in your habitat?

How big is the population?

Will the population continue to grow?

What information do we need to predict population size?

Part 2:What are the limiting factors in an ecosystem?

Which aquariums and terrariums were maintained?

What factors were they influenced by?

Part 3: Population Dynamics

What are some of the ways populations might be influenced by other organisms?

How do limiting factors help support a sustainable ecosystem?

Investigation 8: Human Impact

Part 1: What have you heard about biodiversity?

Why is biodiversity important in an ecosystem?

Why do we sample a section of an ecosystem to determine species?

Part 2:What can happen when a species is added to an ecosystem?

What are some of the species in Hawaii?

Why are some species more successful than others?

Part 3. What impact have people had on Mono Lake?

What is an aqueduct?

Investigation 9: Ecoscenarios

Part 1. Human Involvement

How have humans affected your ecosystem?

What efforts have humans made to lesson this impact?

Part 2. Evaluating Solutions

What are the biotic and abiotic factors?

What is the main problem caused by humans?

What engineering effort were made to solve this problem?

Which solution did your team select?

Enduring Understanding

The Populations and Ecosystems course emphasizes the use of knowledge and evidence to construct explanations about what the essential elements of an ecosystem are, and how the energy flows through an ecosystem. Students will learn about how producers make their own food through photosynthesis, and about the varied roles of consumers and decomposers. Students will learn about the physical elements that are essential to support living organisms within ecosystems. They will construct mini-ecosystems in order to study changes that take place within ecosystems and what organisms need to survive. Students will make predictions about how making changes within an ecosystem will impact other living organisms and how introducing new organisms can create changes to the ecosystem. This unit provides students with the first steps along the path of ecological understanding, with the hope that their future steps will be

considered and measured, serving the interests of all life.

Students will know...

Investigation Guide, Science Resource **Vocabulary**

Investigation 1: Milkweed Bugs

Habitat, organism, individual, population, species, life cycle, clutch, instar, nymph, molt.

Inferences, observations.

Investigation 2: Sorting out Life

Abiotic, biotic, biome, community, ecosystem, ecosystem service, individual, population, population study, controlled experiment, observational study.

Investigation 3: Mono Lake

Decomposer, detritivore, detritus, first-level consumer, food chain, food web, migratory, primary consumer, producer, secondary consumer, second-level consumer, tertiary consumer, third-level consumer.

Investigation 4: Minihabitats

Aquatic, predator, prey, terrestrial.

Investigation 5: Producers

Aerobic cellular respiration, autotroph, biomass, carbohydrate, energy, food, heterotroph, mass, photosynthesis.

Investigation 6: Following the Energy

Bioaccumulation, carnivore, herbivore, omnivore, sustainable, trophic level.

Investigation 7: Population Size

Interdependent, limiting factor, migrate, reproductive potential.

Investigation 8: Human Impact

Biodiversity, field survey, invasive species, sampling, native species, introduced species, interdependent.

Investigation 9: Ecoscenarios

Human involvement, human impact, support, environmental groups, solutions.

COMMON MISCONCEPTIONS

- Students do not believe that plants are living organisms.
- There are more animals than plants.
- Students do not understand how organisms with shorter life spans survive.
- Insects are not important to an ecosystem.

- Students do not understand that every organism plays a role in their ecosystem.
- That populations are made up of more than one organism.
- That food chains and food webs are one in the same.
- Plants are able to make their own food through photosynthesis.
- Some ecosystems have the ability to support unlimited numbers.
- Predators will eat all organisms in an ecosystem.
- Students believe that water is a food source.
- Bringing invasive into an ecosystem will have little or no impact.
- Organisms can consume unlimited amounts of food.

Students will be able to...

Investigation 1: Milkweed Bugs

- Construct a suitable habitat for milkwwed bugs and study their reproductive potential.
- Observe events and changes that yield information about the life cycle of an insect.
- Document the sequence of changes that constitute the milkweed bug's life cycle.

Investigation 2: Sorting out Life

- Analyze and categorize cards using evidence to determine which represent individuals, populations, communities, and ecosystems.
- Identify biotic and abiotic factors in an ecosystem.

Investigation 3: Mono Lake

- Research the functional roles of organisms in the Mono Lake ecosystem in order to construct a food web.
- Develop a model known as a food web to represent feeding relationships between populations.
- Construct explanations about the interactions of an ecosystem in terms of functional roles.

Investigation 4: Minihabitats

- Assemble the abiotic elements of an aquatic and a terrestrial minihabitat as models of natural habitats.
- Introduce organisms into aquatic and terrestrial minihabitats.
- Collect andd analyze data over time, using a scientific log and observational drawings to record interactions and changes in minihabitats.
- Develop a model in the form of a food web for each minihabitat.

Investigation 5: Producers

- Grow plants to determine the role light energy plays in growth of producers in ecosystems.
- Analyze experimental data to determine that plants require water, carbon dioxide, and light to produce biomass.
- Burn food to model and measure the energy transferred from food.

Investigation 6: Following the Energy

- Construct an explanation for how organisms get the energy they need for life.
- Develop and use a model to explain how matter and energy transfer across trophic levels in an ecosystem.

Investigation 7: Population Size

- Calculate the theoretical growth of a population of milkweed bugs, assuming there are no limiting factors.
- Use computer simulations to model how reproductive strategies and limiting factors affect population growth.
- Analyze field observations to determine the effects of biotic factors on population size.
- Describe the population fluctuations in Mono Lake in terms of limiting factors and feeding relationships and support conclusions with evidence.

Investigation 8: Human Impact

- Conduct a field survey of the biodiversity of an ecosystem.
- Calculate the biodiversity index for a sample of the schoolyard.
- Explore the impact of humans on an ecosystem.

Investigation 9: Ecoscenarios

- Discuss ways that human activities affect natural ecosystems.
- Evaluate possible solutions for preserving and restoring natural ecosystems using evidence to support a case.

Recommend natural solutions to balance the sustainability of an ecosystem with human needs for ecosystem services.

STAGE 2- EVIDENCE OF LEARNING

Formative Assessment

- 3- Minute Pause
- A-B-C Summaries
- Analogy Prompt
- Choral Response
- Debriefing
- Exit Card / Ticket
- Hand Signals
- Idea Spinner
- Index Card Summaries
- Inside-Outside Circle Discussion (Fishbowl)
- Journal Entry
- Misconception Check
- Observation
- One Minute Essay
- One Word Summary
- Portfolio Check
- Questions & Answers
- Quiz
- Self-Assessment
- Student Conference
- Think-Pair-Share
- Web or Concept Map

Authentic Assessments

- follow lab procedures
- complete assignments
- develop and utilize models
- cooperate in groups and with partners
- complete a written science journal
- maintain class notes and vocabulary in MacBook Airs
- complete data tables
- complete and interpret graphs

Benchmark Assessments

- Final module exam.
- End of investigation assessments.
- iChecks

- Focus Questions

STAGE 3- LEARNING PLAN

Instructional Map

Earth & Space Science:(Grade 8) 14 weeks

Investigation 1: Milkweed Bugs- 5 sessions

Students are introduced to adult milkweed bugs. They assemble zip-bag habitats to observe the reproduction and life cycles of milkweed bugs. Students observe and record feeding, movement, mating, egg laying, hatching, and molting.

Investigation 2: Sorting out Life- 7 sessions

Students are introduced to basic definitions used in ecological studies. They deepen their understanding by sorting and catagorizing cards. Students watch a video of Jane Goodall's experience in her field study of chimpanzees. Student groups begin a study of major biomes of North America.

Investigation 3: Mono Lake- 7 sessions

Students are introduced to a new ecosystem, alkaline lakes. They identify relationships between the organisms and abiotic factors. Students study the natural history of the major organisms in Mono Lake through feeding relationships and interactions.

Investigation 4: Minihabitats- 5 sessions

Students categorize organisms into two sets based on their living environment, aquatic and terrestrial. Students observe organisms and record findings. They make predictions about interactions and changes. Students maintain minihabitats.

Investigation 5: Producers- 9 sessions

Students plant seeds in light and dark conditions. They monitor and compare results. Students inquire into where food energy comes from. They process data from a hypothetical experiment to discover the conditions under which plants add biomass. Students investigate the producers in their ecoscenario and the biomes they represent. Students use a model to investigate energy transfer in food. They use burning food to heat water in order to quantify food energy and calculate the calories.

Investigation 6: Following- 7 sessions

Students think of the ways organisms use energy to do work and make things happen. Students act out the roles in a food chain from Mono Lake. Students learn a convention, called trophic levels, for describing the movement of food energy from organism to organism in a food web. Students investigate the role of decomposers in the ecosystem by adding a small amount of fruit to their minibabitat and monitoring changes to the fruit.

Investigation 7: Population Size- 8 sessions

After observing their milkweed-bug populations, students calculate the potential population growth at 2-month intervals for a year. They use computer simulation to learn about population limiting factors, and analyze the results of a laboratory study to determine the limiting effects of three abiotic factors. Students analyze the results of a 1-year study of

two important Mono Lake populations. Students review field data acquired by ecologists working at Mono Lake.

Investigation 8: Human Impact- 7 sessions

Students learn about the concept of biodiversity and how it relates ot the health of an ecosystem. They conduct a biodiversity study. Students are introduce to the Hawaiian ecosystem and learn how humans have affeted it for thousands of years. They then identify the positive and negative impacts of human interactions at Mono Lake.

Investigation 9: Ecoscenarios- 7 sessions

Students work together to summarize the factors that define the ecosystem of each ecoscenario an how humans have affected the ecosystems. Students identify a major problem within that ecosytem. They work collaboratively to evalualte solutions. Students consider aspects of both ecology and engineering to select a solution that helps balance the health of the ecosystem and the needs of humans that depend on the ecosystem.

Modification/Differentiation of Instruction

Differentiation Strategies for Special Education Students

- Remove unnecessary material, words, etc., that can distract from the content
- Use of off-grade level materials
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Time allowed
- Level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Varied homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Ability to work at their own pace
- Present ideas using auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment
- Differentiated checklists and rubrics, if available and appropriate

Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-subject areas

Differentiated Strategies for ELL Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials, including visuals
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Allow students to work at their own pace
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Role play
- Provide graphic organizers, highlighted materials

- Strategy and flexible groups based on formative assessment

Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

504 Plans

Students can qualify for 504 plans if they have physical or mental impairments that affect or limit any of their abilities to:

- walk, breathe, eat, or sleep
- communicate, see, hear, or speak
- read, concentrate, think, or learn
- stand, bend, lift, or work

Examples of accommodations in 504 plans include:

- preferential seating

- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

Modification Strategies

- Cooperative Grouping
- Extended Time
- Frequent Breaks
- Highlighted Text
- Interactive Notebook
- Modified Test
- Oral Directions
- Peer Tutoring
- Preferential Seating
- Re-direct
- Repeated Drill and Practice
- Shortened Assisgnment
- Teacher Notes
- Tutorials
- Use of Additional Reference Materials
- Use of Audio Resources

Differentiation Strategies

High Preparation

- Alternative Assessments

- Choice Boards
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Learning Contracts
- Leveled Rubrics
- Literature Circles
- Multiple Intelligence Options
- Multiple Texts
- Personal Agendas
- Project Based Learning (PBL)
- Stations / Centers
- Think-Tac-Toe
- Tiered Activities / Assignments
- Varying Graphic Organizers

Low Preparation

- Choice of Book / Activity
- Cubing Activities
- Exploration by Interest (using interest inventories)
- Flexible Grouping
- Goal Setting With Student
- Homework Options
- Jigsaw
- Mini Workshops to Re-teach or Extend Skills
- Open-ended Activities
- Think-Pair-Share by Readiness, Interest, or Learning Style
- Use of Collaboration
- Use of Reading Buddies
- Varied Journal Prompts
- Varied Product Choice
- Varied Supplemental Materials
- Work Alone / Together

Horizontal Intergration- Interdisciplinary Connections

New Jersey Student Learning Standards for Mathematics

Grade 7

7.RP.A. Analyze proportional relationships and use them to solve real worls mathematical problems.

7.NS.A. Apply and extend previous understandings of operations.

7.EE.B. Solve real life and mathematical problems using numerical and algebraic expressions and equations.

Reading in Science

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

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).

RST.6-8.8.Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Writing in Science

LA.WHST.6-8.1 Write arguments focused on discipline-specific content.

LA.WHST.6-8.1.A Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.

LA.WHST.6-8.1.B Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

LA.WHST.6-8.1.C Use words, phrases, and clauses to create cohesion and clarify the relationships among

claim(s), counterclaims, reasons, and evidence.

LA.WHST.6-8.1.D Establish and maintain a formal/academic style, approach, and form.

LA.WHST.6-8.1.E Provide a concluding statement or section that follows from and supports the argument presented.

LA.WHST.6-8.10 Write routinely over extended time frames (time for research, reflection, metacognition/self correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

LA.WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

LA.WHST.6-8.2.A Introduce a topic and organize ideas, concepts, and information using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.

LA.WHST.6-8.2.B Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

LA.WHST.6-8.2.C Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

LA.WHST.6-8.2.D Use precise language and domain-specific vocabulary to inform about or explain the topic.

LA.WHST.6-8.2.E Establish and maintain a formal/academic style, approach, and form.

LA.WHST.6-8.2.F Provide a concluding statement or section that follows from and supports the information or explanation presented.

LA.WHST.6-8.3 (See note; not applicable as a separate requirement)

LA.WHST.6-8.4 Produce clear and coherent writing in which the development, organization, voice, and style are appropriate to task, purpose, and audience.

LA.WHST.6-8.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

LA.WHST.6-8.6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

LA.WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

LA.WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

LA.WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

2020 New Jersey Student Learning Standards- Computer Science and Design Thinking

Computer Science and Design Thinking Practices

CSDT.K-12.CSDTP1	Fostering an Inclusive Computing and Design Culture
CSDT.K-12.CSDTP2	Collaborating Around Computing and Design
CSDT.K-12.CSDTP3	Recognizing and Defining Computational Problems
CSDT.K-12.CSDTP4	Developing and Using Abstractions
CSDT.K-12.CSDTP5	Creating Computational Artifacts
CSDT.K-12.CSDTP6	Testing and Refining Computational Artifacts
CSDT.K-12.CSDTP7	Communicating About Computing and Design

8.2 Design Thinking

8.2.8.ED.1: Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer. 8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem. 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). 8.2.8.ED.4: Investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a collaborative team. 8.2.8.ED.5: Explain the need for optimization in a design process. 8.2.8.ED.6: Analyze how trade-offs can impact the design of a product. 8.2.8.ED.7: Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues. 8.2.8.ITH.2: Compare how technologies have influenced society over time. 8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system. 8.2.8.ITH.4: Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact. 8.2.8.ITH.5: Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.

8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem. 8.2.8.NT.2: Analyze an existing technological product that has been repurposed for a different function. 8.2.8.NT.3: Examine a system, consider how each part relates to other parts, and redesign it for another purpose. 8.2.8.NT.4: Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.
8.2.8.ETW.1: Illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs. 8.2.8.ETW.2: Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital). 8.2.8.ETW.3: Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact. 8.2.8.ETW.4: Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.
8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies. 8.2.8.EC.2: Examine the effects of ethical and unethical practices in product design and development.

2020 New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills Practices

CRP.K-12.CRP1	Act as responsible and contributing community members and employee.
CRP.K-12.CRP2	Attend to financial well-being.
CRP.K-12.CRP3	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP4	Demonstrate creativity and innovation.
CRP.K-12.CRP5	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP6	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP7	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP8	Use technology to enhance productivity, increase collaboration and communicate effectively.
CRP.K-12.CRP9	Work productively in teams while using cultural/global competence.

9.2 Career Awareness and Planning

9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest. 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest. 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income. 9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.
9.2.8.CAP.11: Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics. 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.

9.4 Life Literacies and Key Skills

9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4). 9.4.8.CI.2: Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3). 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2). 9.4.8.CI.4: Explore the role of creativity and innovation in career pathways and industries.
9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (MS-ETS1-2). 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1). 9.4.8.CT.3: Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.
9.4.8.DC.1: Analyze the resource citations in online materials for proper use. 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8). 9.4.8.DC.3: Describe tradeoffs between allowing information to be public (e.g., within online games) versus keeping information private and secure. 9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences. 9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure. 9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation. 9.4.8.DC.7: Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys. 9.4.8.DC.8: Explain how communities use data and technology to develop measures to respond to effects of climate

change (e.g., smart cities).
9.4.8.GCA.1: Model how to navigate cultural differences with sensitivity and respect (e.g., 1.5.8.C1a). 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
9.4.8.IML.1: Critically curate multiple resources to assess the credibility of sources when searching for information. 9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information. 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b). 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations. 9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data. 9.4.8.IML.6: Identify subtle and overt messages based on the method of communication. 9.4.8.IML.7: Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8). 9.4.8.IML.8: Apply deliberate and thoughtful search strategies to access high-quality information on climate change (e.g., 1.1.8.C1b). 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2). 9.4.8.IML.10: Examine the consequences of the uses of media (e.g., RI.8.7). 9.4.8.IML.11: Predict the personal and community impact of online and social media activities. 9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience. 9.4.8.IML.13: Identify the impact of the creator on the content, production, and delivery of information (e.g., 8.2.8.ED.1). 9.4.8.IML.14: Analyze the role of media in delivering cultural, political, and other societal messages. 9.4.8.IML.15: Explain ways that individuals may experience the same media message differently.
9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4). 9.4.8.TL.3: Select appropriate tools to organize and present information digitally. 9.4.8.TL.4: Synthesize and publish information about a local or global issue or event (e.g., MS-LS4-5, 6.1.8.CivicsPI.3). 9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration. 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

Vertical Integration- Discipline Mapping

Grade 5: Living Systems

Grade 6: Diversity of Life

Preparation for High School Science Curriculum.

Additional Materials

- Classroom posters for safety
- Classroom posters for life cycles, food webs, and ecosystems
- Word Wall

- You Tube videos on food and energy
- Bill Nye short video on life cycles and food webs
- Colored pencils for coding
- Students resource book
- Student notebooks
- Cheese balls for calorie burning and measuring
- Foss web site
- Quizlet website